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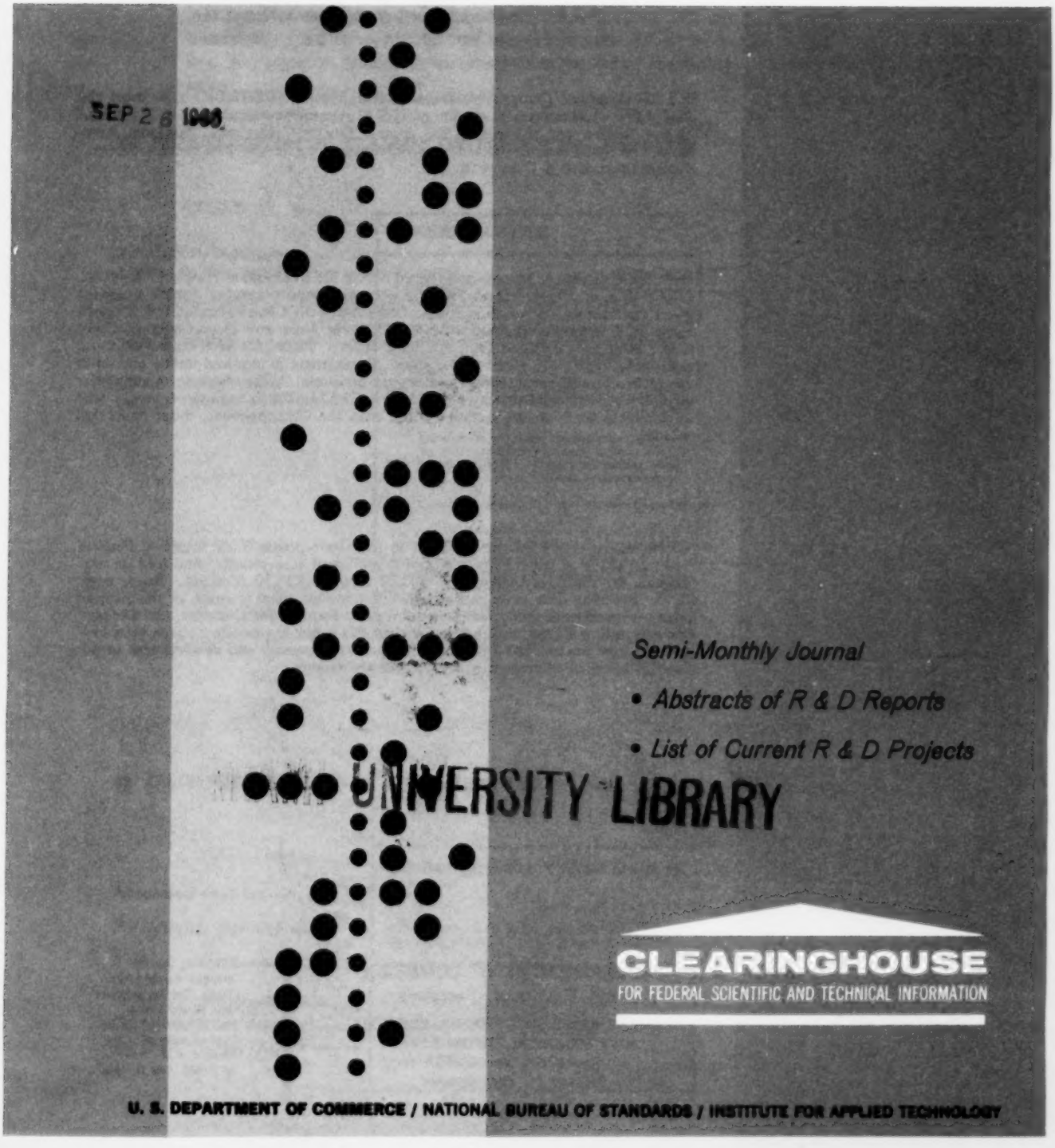
August 10, 1966

U.S. GOVERNMENT

RESEARCH & DEVELOPMENT REPORTS



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Semi-Monthly Journal

- *Abstracts of R & D Reports*
- *List of Current R & D Projects*

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U. S. DEPARTMENT OF COMMERCE / NATIONAL BUREAU OF STANDARDS / INSTITUTE FOR APPLIED TECHNOLOGY

August 10, 1966 / Volume 41, Number 15

U.S. Government

RESEARCH AND DEVELOPMENT REPORTS

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PURPOSE

U.S. Government Research & Development Reports (USGRDR) announces the availability of selected new reports of U.S. Government-sponsored R & D released by the Department of Defense, the Atomic Energy Commission, National Aeronautics & Space Administration, and other agencies. It also lists current Government-sponsored R & D projects.

TO ORDER REPORTS

With few exceptions, reports announced herein are available to the public from the Clearinghouse. Order reports by the accession/report number (stock number) given on the first line of each entry. Order from the Clearinghouse, U.S. Department of Commerce, Springfield, Va. 22151, or from any Department of Commerce Field Office (listed on inside back cover). Prices for hard copy (HC) and microfiche (MF) are given in the entry. Prepayment is required unless purchases are to be charged to Clearinghouse deposit accounts. Make check or money order payable to National Bureau of Standards—CFSTI. When reports are announced as available from an organization other than the Clearinghouse, order from that source.

INDEX

All entries in USGRDR are indexed in the *Government-Wide Index to Federal Research & Development Reports (GWI)* published semi-monthly and sold on subscription by the Clearinghouse at $22.00 a year ($27.50 foreign). Single copy $1.75. Indexing data from recent issues of announcement journals of the Atomic Energy Commission, National Aeronautics and Space Administration, and Defense Documentation Center are also included in this index to provide a single reference guide to new unclassified Government-sponsored research and development in the physical sciences, engineering, and related technology.

U.S. DEPARTMENT OF COMMERCE
John T. Connor, Secretary

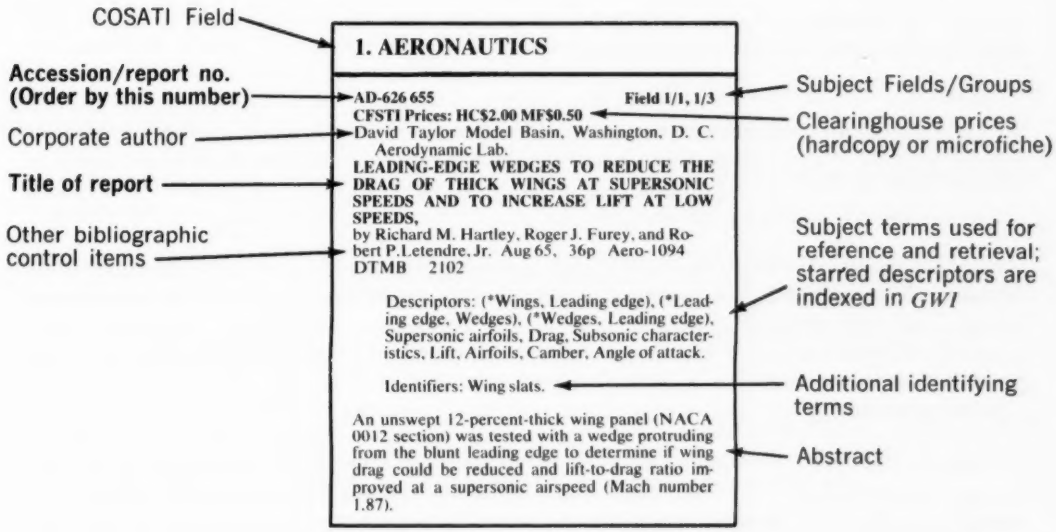
CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION
Springfield, Va. 22151
Bernard M. Fry, Director

Contents may be printed freely. Mention of source will be appreciated. Use of funds for this publication approved by the Director of the Bureau of Budget, June 22, 1966.

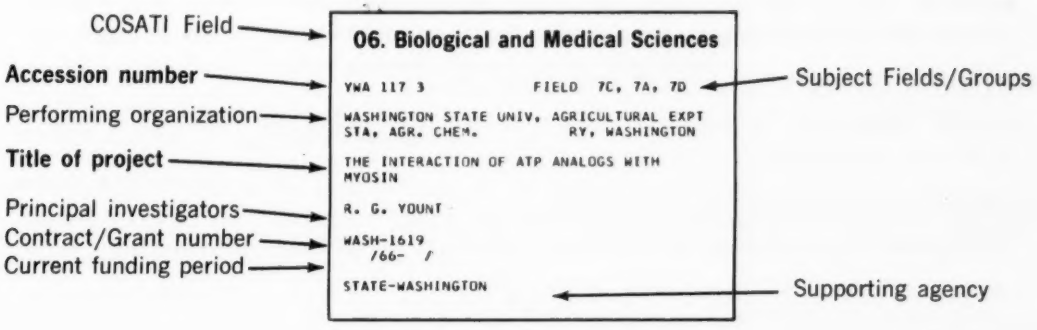
USGRDR FORMAT

Entries are arranged under 22 subject categories called FIELDS. In the entry, subcategories called GROUPS and occasionally sub-groupings are also indicated. This system was adopted by the Committee on Scientific and Technical Information (COSATI) of the Federal Council on Science and Technology. The COSATI Subject Category List, AD 612 200, is available from the Clearinghouse at $1.00. Documents are listed alphanumerically (that is, alphabetic data precedes numerical data) by accession/report number. Key segments of information contained in the entries are identified diagrammatically below.

● RESEARCH & DEVELOPMENT REPORTS


COSATI Field
1. AERONAUTICS
Accession/report no. (Order by this number)
AD-626 655
Field 1/1, 1/3
Subject Fields/Groups
CFSTI Prices: HC$2.00 MF$0.50
Clearinghouse prices (hardcopy or microfiche)
Corporate author
David Taylor Model Basin, Washington, D. C. Aerodynamic Lab.
Title of report
LEADING-EDGE WEDGES TO REDUCE THE DRAG OF THICK WINGS AT SUPERSONIC SPEEDS AND TO INCREASE LIFT AT LOW SPEEDS,
Other bibliographic control items
by Richard M. Hartley, Roger J. Furey, and Robert P. Letendre, Jr. Aug 65, 36p Aero-1094 DTMB 2102
Subject terms used for reference and retrieval; starred descriptors are indexed in GWI
Descriptors: (*Wings, Leading edge), (*Leading edge, Wedges), (*Wedges, Leading edge), Supersonic airfoils, Drag, Subsonic characteristics, Lift, Airfoils, Camber, Angle of attack.
Identifiers: Wing slats.
Additional identifying terms
An unswept 12-percent-thick wing panel (NACA 0012 section) was tested with a wedge protruding from the blunt leading edge to determine if wing drag could be reduced and lift-to-drag ratio improved at a supersonic airspeed (Mach number 1.87).
Abstract

● CURRENT R & D PROJECTS



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01 AERONAUTICS 1

Includes aerodynamics; aeronautics; aircraft; aircraft flight control and instrumentation; and air facilities.

02 AGRICULTURE 3

Includes agricultural chemistry; agricultural economics; agricultural engineering; agronomy and horticulture; animal husbandry; and forestry.

03 ASTRONOMY AND ASTROPHYSICS 3

Includes astronomy; astrophysics; and celestial mechanics.

04 ATMOSPHERIC SCIENCES 4

Includes atmospheric physics and meteorology.

05 BEHAVIORAL AND SOCIAL SCIENCES 9

Includes administration and management; documentation and information technology; economics; history, law and political science; human factors engineering; humanities; linguistics; man-machine relations; personnel selection, training, and evaluation; psychology (individual and group behavior); and sociology.

06 BIOLOGICAL AND MEDICAL SCIENCES 28

Includes biochemistry; bioengineering; biology; bionics; clinical medicine; environmental biology; escape, rescue, and survival; food; hygiene and sanitation; industrial (occupational) medicine; life support; medical and hospital equipment and supplies; microbiology; personnel selection and maintenance (medical); pharmacology; physiology; protective equipment; radiobiology; stress physiology; toxicology; and weapon effects.

07 CHEMISTRY 42

Includes chemical engineering; inorganic chemistry; organic chemistry; physical chemistry; and radio and radiation chemistry.

08 EARTH SCIENCES AND OCEANOGRAPHY 51

Includes biological oceanography; cartography; dynamic oceanography; geochemistry; geodesy; geography; geology and mineralogy; hydrology and limnology; mining engineering; physical oceanography; seismology; snow, ice, and permafrost; soil mechanics; and terrestrial magnetism.

09 ELECTRONICS AND ELECTRICAL ENGINEERING 55

Includes components; computers; electronic and electrical engineering; information theory; subsystems; and telemetry.

10 ENERGY CONVERSION (Non-Propulsive) 67

Includes conversion techniques; power sources; and energy storage.

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11 MATERIALS 69

Includes adhesives and seals; ceramics, refractories, and glasses; coatings, colorants, and finishes; composite materials; fibers and textiles; metallurgy and metallography; miscellaneous materials; oils, lubricants, and hydraulic fluids; plastics; rubbers; solvents, cleaners, and abrasives; and wood and paper products.

12 MATHEMATICAL SCIENCES 77

Includes mathematics and statistics and operations research.

13 MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING 81

Includes air conditioning, heating, lighting, and ventilating; civil engineering; construction equipment, materials, and supplies; containers and packaging; couplings, fittings, fasteners, and joints; ground transportation equipment; hydraulic and pneumatic equipment; industrial processes; machinery and tools; marine engineering; pumps, filters, pipes, tubing, fittings, and valves; safety engineering; and structural engineering.

14 METHODS AND EQUIPMENT 89

Includes cost effectiveness; laboratories, test facilities, and test equipment; recording devices; reliability; and reprography.

15 MILITARY SCIENCES 94

Includes antisubmarine warfare; chemical, biological, and radiological warfare; defense; intelligence; logistics; nuclear warfare; and operations, strategy, and tactics.

16 MISSILE TECHNOLOGY 96

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17 NAVIGATION, COMMUNICATIONS, DETECTION, AND COUNTERMEASURES 97

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18 NUCLEAR SCIENCE AND TECHNOLOGY 100

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19 ORDNANCE 112

Includes ammunition, explosives; bombs; combat vehicles; explosions, ballistics, and armor; fire control and bombing systems; guns; rockets; and underwater ordnance.

20 PHYSICS 114

Includes acoustics; crystallography; electricity and magnetism; fluid mechanics; masers and lasers; optics; particle accelerators; particle physics; plasma physics; quantum theory; solid-mechanics; solid-state physics; thermodynamics and wave propagation.

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Metalworking and Metal Forming . . . . . viii-ix
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Biological and Medical Sciences

CONFERENCE PAPERS ON RADIOACTIVE PHARMACEUTICALS PUBLISHED

(Order Stock No. CONF-651111 Radioactive Pharmaceuticals, HC $5.00/ MF $3.00.)

The 40 papers presented at the Symposium on Radioactive Pharmaceuticals held in Oak Ridge, Tenn., Nov. 1-4, 1965, have been published in book form by the Atomic Energy Commission. The purpose of the symposium, the ninth in medicine sponsored by the Medical Division of the Oak Ridge Institute of Nuclear Studies, was to summarize and correlate the recent advances in the development of radioactive pharmaceuticals for use in clinical medicine and biological research. Participants included those in the fields of biochemistry, pharmacology, radionuclide production, nuclear medicine, the radiopharmaceutical industry, and Government regulatory agencies. Subjects discussed cover radiochemical purity, stability, and quality control, as well as more fundamental subjects such as the principles of radionuclide labeling, methods of radionuclide production, and pharmacologic properties of localization. In addition to the benefits of the symposium itself, AEC believes the 40 papers presented will provide a useful reference source for workers in this important new area of medicine.

N. I. H. REVIEWS MENTAL RETARDATION STUDIES

(Order Stock No. PB-170 605 Diseases of the Nervous System Resulting From Metabolic Defects, HC $5.00/MF $3.00.)

The National Institutes of Health has published a review of studies sponsored by its National Institute of Neurological Diseases and Blindness covering inborn errors of metabolism associated with mental retardation. The review covers a number of inherited diseases in which there is some underlying metabolic abnormality, approximately 40 of which are associated with mental retardation in children. Excluded from the review are the inborn errors which become manifest clinically after the age of 17 years, and those which become manifest earlier in life but are not associated with mental retardation. NINDB notes that all inherited metabolic diseases are protein diseases since the basic mechanism in these disturbances is a genetically determined defect in enzyme function, and all enzymes are proteins; however, for easier understanding the review groups them in accordance with the substrate involved in the specific enzymatic process. The following classification is according to the substrates: protein, carbohydrate, lipid, trace metals, renal transport, endocrine, and hyperbilirubinemia and methemoglobinemia. This list includes all inborn errors of metabolism associated with mental retardation without considering whether or not NINDB supports research in a given disease category. Its purpose is to give an overall view of the magnitude of this field, a reasonably logical order to subsequent discussion of individual disorders, and some insight into areas unexplored through NINDB grants.

Engineering and Construction

BUREAU OF PUBLIC ROADS HIGHWAY ENGINEERING REPORTS

(Order Stock No. PB-169 838 Correlation of Concrete Properties With Tests for Clay Content of Aggregate, HC $1.00/MF $0.50;
PB-169 839 A Performance Investigation of Pile Driving Hammers and Piles, HC $7.00/MF $1.75;
PB-169 840 A Performance Investigation of Pile Driving Hammers and Piles, Appendix A, HC $4.00/MF $0.75;
PB-169 841 A Performance Investigation of Pile Driving Hammers and Piles, Appendix B, HC $6.00/MF $1.25;
PB-169 842 Durability Studies of Structural and Paving Concretes: Phase I, Durability of Bridge Deck Concrete, HC $5.00/MF $1.00;
PB-169 845 Findings From the Use of Compensated Shrinkage Portland Cement in the Lodi Freeway Experimental Pavement, HC $2.00/MF $0.50;
PB-169 846 The Properties of Chert Aggregates in Relation to Their Deleterious Effect in Concrete, HC $5.00/MF $1.00;
PB-169 847 Effects of Air-Entraining Agents on Concrete Properties, HC $1.00/MF $0.50;
PB-169 848 Fatigue Strength of 3/4 Inch Studs in Lightweight Concrete, HC $2.00/MF $0.50;
PB-169 849 Report on Weathering of Serpentine Aggregates, HC $1.00/MF $0.50;

PB-169 851 Modelling Highway Location as a Hierarchically-Structured Sequential Decision Process, HC $2.00/MF $0.50;
PB-169 853 Evaluation of Effectiveness of Roadside Delineators, HC $4.00/MF $0.75;
PB-169 854 Effectiveness of Median Barriers, HC $2.00/MF $0.50;
PB-169 864 Railing Type Bridge Lighting, HC $4.00/MF $0.75;
PB-169 868 Terrain Investigation Techniques for Highway Engineers, HC $4.00/MF $0.75;
PB-169 481 An Annotated Bibliography on the Geometric Characteristics of Mineral Aggregates for Pavement Purposes, HC $3.00/MF $0.75; and
PB-169 509 Development of Nuclear Density Tests for Hot Asphalt Pavement, HC $2.00/MF $0.50.)

The above studies on aspects of highway engineering and construction were carried out by the various State Highway Departments and Departments of Civil Engineering of colleges and universities in cooperation with the Bureau of Public Roads, U. S. Department of Commerce.

Management Control, Decision Systems

FOREIGN MARKET SURVEYS AVAILABLE TO U. S. EXPORTERS

(Order Stock No. PB-170 344 West German Plastics Market, HC $4.00/MF $0.75;
PB-170 345 Market for Aircraft Maintenance Equipment in Japan, HC $4.00/MF $1.00;
PB-170 346 Market for Aircraft Communications Equipment in Japan, HC $3.00/MF $0.50;
PB-170 347 Industrial Instrumentation Market in Mexico, HC $2.00/MF $0.50;
PB-170 348 Packaging and Packing Machinery Market in Mexico, HC $2.00/MF $0.50;
PB-170 349 Japanese Market for Hotel, Restaurant and Institutional Kitchen Equipment, HC $3.00/MF $0.75;
PB-170 350 Market for Equipment and Appliances for Institutional Kitchens in France, HC $2.00/MF $0.50;
PB-170 351 Dental Equipment Market in Italy, HC $3.00/MF $0.75;
PB-170 352 Market for Food Processing Equipment in Italy, HC $2.00/MF $0.50;
PB-170 353 Commercial and Industrial Refrigeration Machinery and Equipment Market in Spain, HC $3.00/MF $0.50; and
PB-170 737 Market for Oceanographic Equipment in West Germany, HC $3.00/MF $0.75.)

The above series of Foreign Market Surveys have been prepared by overseas market research firms for the Business and Defense Services Administration, U. S. Department of Commerce, as part of a United States program to help U. S. firms initiate, develop, or expand their exports. The Surveys were made to help U. S. exporters determine the attractiveness of exhibiting their products at foreign trade fairs. They are detailed studies of the market for specific commodities.

Metals, Non-Ferrous and Alloys

NEW PROCESS FOR ANODIZING TITANIUM

(Order Stock No. AD-633 986 Process for Anodizing Titanium, HC $2.00/MF $0.50.)

Watervliet Arsenal has developed a process for anodizing titanium that will reduce galling and seizing and will not adversely affect the base metal. The coating can be applied with comparative ease using conventional materials and equipment. When comparatively tested with other anodized or conversion coatings for titanium, the Arsenal found the new coating to be considerably more acceptable. The anodizing system uses an aqueous bath composed of a fixed amount of sodium hydroxide, sodium silicate, titanium dioxide, and activated carbon. The Watervliet program was initiated because titanium, unlike most metals, has a tenacious oxide coating that reoccurs almost spontaneously. Consequently, the metal is not receptive to metal deposition except under sophisticated cleaning and deoxidizing procedures. This oxide interference presents a barrier to an initmate bond regardless of the type and manner of coating applied, and titanium fabricators have initiated countless investigations to overcome this unfavorable characteristic. Hence this program is to provide a barrier layer that would reduce or eliminate the severe galling that occurs when titanium is subjected to rubbing or sliding forces.

RELIABLE TECHNIQUES FOR EXTRUDING AND DRAWING TUNGSTEN

(Order Stock No. NMI-1264 Fabrication of Seamless Tungsten and Tungsten-Rhenium Tubing, HC $6.00/MF $1.25.)

Reliable extrusion and drawing techniques have been developed by Textron's Nuclear Metals Division for the fabrication of seamless tubing of unalloyed tungsten and tungsten-25 rhenium. Tungsten extrusion was accomplished at 1200°C by the filled-billet technique. The billet is comprised of a sintered tungsten sleeve, molydenum fillers, a graphite core, and a steel can. The process was demonstrated for tubes with an o.d. between 0.375 and 0.250 inch, with wall thickness between 0.060 and 0.020 inch. According to Nuclear Metals, such extruded tubing is suitable stock for warm drawing. A similar reliable process was also developed for the extrusion of seamless W-25 Re tubing using molybdenum fillers with an axial graphite core. An extrusion temperature of 1600°C was selected for the reference process to obtain stock suitable for warm drawing, but temperatures ranging from 1400 to 2000°C gave suitable stock. Four drawing techniques were shown to be feasible for both materials: drawing without a mandrel (sinking); drawing with a deformable mandrel, usually consisting of the extrusion filler; drawing with a moving hardened mandrel (rod drawing); and drawing with a stationary hardened mandrel (plug drawing).

Metalworking and Metal Forming

BATTELLE REVIEWS MACHINING OF NICKEL AND COBALT ALLOYS

(Order Stock No. AD-634 075 Machining and Grinding of Nickel- and Cobalt-Base Alloys, HC $5.00/MF $1.00.)

A Battelle Memorial Institute review notes that the high strengths of nickel and cobalt alloys not only increase the horsepower requirements for machining, but high cutting temperatures lead first to welding then progressive buildup of particles from the chip on the tool. This is followed by progressive edge chipping and poor surface finishes as the welded-on metal breaks away from the tool. High temperatures experienced in grinding lead to reactions between the abrasive grains and the workpiece. This causes dulling of the grinding wheels by capping the grains with welded-on metal. The grains then may break down prematurely or the wheel may glaze depending on the hardness of the wheel.

BATTELLE REPORTS ON TITANIUM PROCESSING

(Order Stock No. AD-634 141 Deformation Processing of Titanium and Its Alloys, HC $7.00/MF $1.75.)

One of the difficulties in the fabrication of titanium and its alloys is that much of the work has been done until very recently on equipment designed for fabricating stainless steel. Battelle Memorial Institute points out that this is especially important for operations such as rolling where the surface of the titanium must be conditioned more frequently, closer control of working temperature is required, smaller reduction during initial breakdown operations is needed, and fabrication must be done at the lowest practical temperature. Working pressures higher than those used for steel usually are developed. However, titanium alloys can generally be extruded by techniques similar to those used for steel. Glass lubricants and ram speeds of 200 to 400 inches per minute are used.

SHAPING TITANIUM BY METHODS OTHER THAN MACHINING

(Order Stock No. AD-634 192 The Making of Titanium and Titanium-Alloy Shapes by Casting, Powder Metallurgy, and Other Processes, HC $4.00/MF $0.75.)

The state-of-the-art of making titanium and titanium-alloy shapes by methods other than machining from wrought materials is reviewed by Battelle. Methods covered are casting, powder metallurgy, metal spraying, electroforming, and chemical vapor deposition. Of these methods only casting and powder metallurgy are being used to any great extent or offer a great deal of promise. Metal spraying may have some very specialized applications. In their present state of development, electroforming and chemical vapor deposition are not promising methods for making titanium parts. Most of the titanium and titanium alloys presently used are wrought materials arrived at by melting sponge, casting into ingots, rolling into mill shapes, then forging and/or machining into the desired final shapes.

MECHANICAL FASTENING TECHNIQUES SURVEYED FOR NICKEL ALLOYS

(Order Stock No. AD-634 260 Mechanical Fastening of Nickel-Base Alloys, HC $3.00/MF $0.75.)

The unique properties of nickel-base alloys require procedures for fabricating mechanically fastened joints that differ from the ordinary procedures used for mechanically fastening more common structural materials. Fabrication of mechanically fastened joints using nickel-base alloys can be an expensive operation because the materials costs are high, the machining rates are low, and the materials must be carefully cleaned for most applications. Battelle Memorial Institute has prepared a report that surveys existing fastening techniques applicable to these alloys.

Transportation (Land, Sea, Air, Space)

TELEVISION SURVEILLANCE SYSTEM TAPES COLLISIONS

(Order Stock No. PB-170 602 Accident Sensing and Surveillance System, HC $3.00/MF $0.75.)

An accident sensing and surveillance system developed by the Cornell Aeronautical Laboratory can record on video tape events leading up to and including a motor vehicle collision at urban intersections. The system consists of two virtually independent subsystems -- a detection-discrimination system and a surveillance-storage system. The detection-discrimination system is designed to identify those sounds associated with motor vehicle crashes, while disregarding other sounds common to urban intersection environments. The surveillance-storage system consists of a pair of continuously operating narrow bandwidth television systems and two magnetic tape units. The television system's video signals are continuously recorded on one tape unit containing a tape loop. When a detect signal is received from the detection-discrimination system, the information is read from the tape loop and re-recorded on a permanent storage tape for later analysis. The laboratory model of the system operating at 15 frames per second has the capability of televising and recording the image of an automobile 230 feet from the center of an intersection with a resolution permitting a measurement of its instantaneous position to within plus or minus 5 feet.

LIST OF OTR "PACKAGED" REVIEWS

A recently initated program of the Clearinghouse for Federal Scientific and Technical Information provides timely information on new Government R and D having significant industrial interest. Such information is condensed into reports called "packages." These highlight key material and amply annotate and code the comments to Government-sponsored reports originating with the Department of Defense, NASA, AEC, and numerous other agencies.

The Clearinghouse package program represents one facet of the more general Department of Commerce program for increasing the flow of Government-generated scientific and technical information to the industrial community and the public generally. Subjects selected for coverage arise from various sources: industry, state, and regional groups; research institutions; and Government and internal sources. They include the 38 specific titles which follow and exclude such broader areas as textiles, lubricants, and human engineering.

As of July 1, 1966, there is a $1.00 per copy distribution charge for the reviews listed. Order from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Va. 22151, or from any Department of Commerce Field Office.

★ ★ ★ ★ ★ ★

The following are brief abstracts of the packages developed since the program's inception in September 1964.

OTR-101 HOT MACHINING reviews significant reports relating to easier and cheaper methods of turning and milling many metals and alloys. Possible improvements in tool life, cutting speeds and costs are noted. Avenues which yielded unsatisfactory results are also mentioned.

OTR-102 NICKEL-TITANIUM ALLOYS is a summary of recent developments in malleable intermetallic compounds for high strength at elevated temperatures, for unique corrosion and wear resistance, and for elastic and damping applications. Strong ductile alloys based on nickel-titanium are of particular interest. Reference to other intermetallic compounds is also included.

OTR-103 PHOTOCHROMISM AND PHOTOTROPISM summarizes the intensive Government R and D programs, both basic and applied, which have resulted in reversible systems for possible use in eye-protective devices, optical memory devices, optical memory devices in computers, and modulating or monitoring light valves.

OTR-104 FIRE-EXTINGUISHING MATERIAL TECHNOLOGY covers reports in such areas as water-base materials, powders, foams, combined powders and foams, and gas and propellant fire control. The results of the studies have potential applicability in both product development and hazard control.

OTR-105 FLAME-RETARDANT TEXTILES relates to improved clothing materials which have been developed for use in unusual and ordinarily destructive environments. New techniques such as flame-proofing and melt-proofing have been investigated in connection with the development of protective textiles.

OTR-106 HUMIDITY-CONTROLLED WAREHOUSING discusses R and D on preservation methods and on the economics of storage in a variety of environments. Testing programs related to the storage of food, water, and equipment, and the design of humidity-controlled warehouses are included. The research results are of potential value to manufacturers and others seeking to improve life of materials.

OTR-107 CONCRETE TECHNOLOGY is a summary of studies relating to: improving the strength of conventional composition concrete; better shock resistance in lightweight concrete; corrosion protection of steel-reinforced concrete; prestressed concrete applications; and protective coatings for concrete. This research is expected to offer leads to new applications for stronger, more lightweight, more shock-resistant, or less permeable concrete pavements and structures.

OTR-108 VOLATILE CORROSION INHIBITORS covers Government efforts on corrosion control for steel which is protected under a variety of conditions, the effect of inhibitor materials on nonferrous metals, and the use of packaging materials for protective purposes. Volatile corrosion inhibitors may be dissolved in oils or coated on paper within enclosed shipment parcels or storage spaces, or used as salts. They offer improved corrosion protection of bare steel while in a ready condition for later withdrawal or immediate use.

OTR-109 GREASE LUBRICATION summarizes research pertaining to steel surfaces in contact with lubrication formulations, additives to greases to reduce corrosion, and variations in method and degree of loading and vibration. The results of these studies of lubricant grease are expected to provide useful information to manufacturers seeking to increase the life of steel parts exposed to sliding, rubbing, and rolling friction.

OTR-110 THERMOELECTRIC MATERIALS AND FABRICATION covers new materials, improvement of known thermoelectric materials and material bonding techniques, new testing procedures, and module fabrication methods. Significant results have evolved in each area.

OTR-111 INTEGRATED CIRCUITRY discusses R and D relating to circuit device design, fabrication, and application to electronic systems in terms of the economic and technical factors involved. Consideration is given to costs and process control as well as the reliability of integrated circuits, their performance in systems in comparison to normal circuits, and their environmental protection.

OTR-112 FLUID AMPLIFICATION indicates that fluid amplification is a feasible technqiue and holds promise for application in extreme environments such as high radiation flux, high temperatures, and shock vibrations. Initial use is expected in military applications where the potential advantages outweigh the development costs.

OTR-113 ULTRASONIC FABRICATION reviews ultrasonic cleaning, welding, and fabrication research. Attention is given to deformation characteristics of metals, applications to wire drawing, rolling and welding of refractory metals, and applications to transistor fabrication.

OTR-114 ULTRASONIC TESTING highlights research efforts in the development of the theory and practice of ultrasonic testing of materials. Major efforts have been directed

towards: development of instruments, techniques and standards; application of ultrasonics to the measurement of residual stress and fatigue; and application in the nuclear, plastic and construction fields.

OTR-115 HIGH ENERGY METAL FORMING summarizes efforts directed towards the attainment of the basic parameters of metal performance and their application to high energy metal extrusion and sheet metal forming.

OTR-116 NUMERICAL CONTROLS covers the adaptation of computer control to various manufacturing processes. The investigations cited cover programming for numerical control, tool controlling, retrofitting to numerical controls, evaluating numerical control fabricated forging dies, and other applications of numerical control fabricated forging dies, and other applications of numerical control.

OTR-117 DIELECTRIC FILMS IN MICROELECTRONICS deals with investigations of suitable materials for use as dielectrics; analysis of the parameters involved in attempting to obtain a reproducible process; refinement or development of dielectric fabrication techniques; testing of selected dielectric materials for long time stability; improvements of existing thin film dielectrics; and fabrication of circuits utilizing selected thin film capacitors.

OTR-118 FIBER OPTICS outlines the theoretical advancements which have been made recently. Consideration is given to experimental devices utilizing optical fibers.

OTR-119 HONEYCOMB AND SANDWICH MATERIALS summarizes advances in the manufacturing methods, design, and characteristics of materials used in honeycomb sandwich panels. The reports cover a wide range of uses, from panels for building construction to molybdenum and columbium panels for heat shields and structural applications to aerospace vehicles.

OTR-120 MICROMINIATURE CIRCUIT PACKAGING TECHNIQUES reviews advances relating to conventional or discrete components, thinfilm integrated circuits, and monolithic semiconductor integrated circuits. Numerous advancements in the state of the art are noted.

OTR-121 FOAM TECHNOLOGY AND APPLICATION covers foam materials for a variety of applications, including structural members for a number of different types of buildings; thermal barriers; and shock and vibration insulation. Also studied are buoyancy and energy attenuation characteristics. Materials research areas include development of stronger materials, improved energy dissipating properties, more resistance to charring, and better moisture control during manufacture.

OTR-122 DISPERSION-HARDENED METALS AND ALLOYS revolves about the enhancement of the strength properties of metals and alloys. Various materials were investigated for the matrices and dispersants in the efforts to meet the need for strong lightweight structural materials.

OTR-123 SOLID FILM LUBRICATION covers research on the development and testing of new bulk solid or solid-film lubricant materials for special applications at extreme temperatures and high vacuum, for exposure to radiation, or for minimizing servicing. Considerable attention has also been paid to new lubrication systems and testing equipment.

OTR-124 NONDESTRUCTIVE EVALUATION OF MATERIALS deals with metals and other structural materials. The methods investigated included the use of Hall-effect devices, X-ray, infrared, gamma-ray, ultrasonic, electromagnetic and liquid penetrant techniques. Specimens included metals, alloys, fiberglass, and ceramic coatings.

OTR-125 MICROMINIATURIZATION OF CIRCUIT COMPONENTS discusses the technological programs which contributed to significant reductions in size of discrete conventional components such as resistors, capacitors, inductors, filters, crystal units, and diodes.

OTR-126 ORGANIC SEMICONDUCTORS indicates that R and D in this field has proceeded within certain technical constraints which make it a promising yet rapidly developing field. This survey discusses some of these factors in terms of materials understanding and synthesis. Attention is also given to those developments which have been concerned with the electrical parameter measurements and evaluation of organic semiconductor materials.

OTR-127 FIBER-REINFORCED METALS AND ALLOYS describes R and D along two lines: the development of whiskers of high strength metals or ceramics for use as reinforcing agents; and the development of metal matrices reinforced by metals, ceramics, or glass. Various types of materials for fibers and promising matrix materials are discussed. Whiskers are grown chiefly by vapor deposition techniques. Fiber-matrix composites developed and tested include steel-silver, tungsten-silver, and alumina-nickel.

OTR-128 PLASTIC COATINGS indicates that commercially available products and new technqiues developed specifically for military and aerospace projects offer a wide range of uses for industry as well. Fluidized bed techniques result in coatings for many applications. New materials, techniques, and applications were subjected to intensive study. Metallized teflon has good possibilities for capacitors in extreme-service circuitry. Teflon itself may be electrodeposited as well as sprayed.

OTR-129 BRAZING TECHNOLOGY AND APPLICATION covers Government R and D in connection with the rapidly advancing space effort and the equally dynamic nuclear reactor field. Applications include joining refractory metals under conditions heretofore extremely difficult. Requirements for joining metals without heating them past their recrystallization point, and for fabricating complex forms, such an honeycomb structures, have greatly increased the need for new and improved brazing techniques.

OTR-130 HIGH TEMPERATURE, FIRE-RESISTANT HYDRAULIC FLUIDS notes that significant advances have been made in developing hydraulic fluids which are fire resistant at high temperatures and are compatible with many existing paints, elastomers and plastics with which they may come in contact. This report evaluates the status of presently available high-temperature, fire-resistant hydraulic fluids and describes recent research and development on the most promising new types now being studies.

OTR-131 HIGH TEMPERATURE PROTECTIVE COATINGS FOR MOLYBDENUM AND TUNGSTEN emphasizes fundamental studies on the breakdown mechanisms of protective coatings and testing of commercially available coatings. Protective coatings are available which function properly under specific circumstances; however, to date, durable protective coatings for ultra-high temperatures are not commercially available. The great need for them has resulted in a large amount of research effort, but as yet this effort has produced no widely applicable solutions.

OTR-132 HIGH TEMPERATURE ADHESIVES ABOVE 500°F relates some of the programs undertaken to date for upgrading

performance limits such as those relating to joint designs, bonding processes and compatibility of substrate thermal expansion coefficients. Organic materials are being synthesized which yield a significant increase in strength in tests of 1 to 500 hours at 500°F. Certain adhesives have been found which exhibit some minimal strength after ten minutes at 1000°F. The adhesive joining of metal structural members is now being applied in the construction of high speed aircraft and holds promise of being extended into other areas such as the automotive industry.

OTR-133 THIN FILM PROTECTIVE COATINGS highlights some of the studies relating to oxide coatings applied at low temperatures and their relevance for corrosion control. Phosphate and other types of undercoats have been examined. Various newer types of protective films include oxide and other chemical conversion types, organic, organic electrodeposited and painted films. Recent research on the above coatings has led to the development of films which, while affording a high degree of protection to metals, do not interfere with normal or dry-film lubrication.

OTR-134 PHOTOCONDUCTIVITY notes that Government R and D has been directed along three broad lines: theoretical analysis, materials research, and systems application and requirements. Materials and systems have been developed which are responsive to visible, infrared, and millimeter wave energy. Auxiliary cooling systems have been developed for applications where the energy gap is low. Much work has gone into developing techniques for analyzing and predicting the photoconductive process.

OTR-135 ELECTROLUMINESCENCE considers both intrinsic and carrier injection electroluminescence, and covers investigation of material properties and fabrication techniques, assembly and testing of screens and display panels, and use of carrier injection electroluminescence diodes and light sources.

OTR-136 TITANIUM ALLOYS covers significant reports since 1964 with reference to earlier works on the properties and fabrication of titanium alloys. Increased knowledge of the alloys has suggested new industrial applications as well as their broadening application in the military and aerospace programs.

OTR-137 BERYLLIUM--ITS CHARACTERISTICS AND APPLICATIONS summarizes a number of characteristics which make beryllium industrially valuable. These concern its density, cold work strength, fatigue properties, strength-to-weight ratio, modulus of elasticity and thermal properties. However, certain fabrication problems limit its use. Numerous programs are underway to find solutions to these problem areas.

OTR-138 SYNTHESIS OF THERMALLY STABLE ELASTOMERS reviews the progress in government R and D which has been directed to the synthesis of new polymers and evaluation of suitable compounds to improve the stability of current elastomers. Progress is being made in both these areas. Large groups of inorganic and semi-inorganic polymer systems were evaluated including silazanes, siloxanes, and fluorocarbons.

RESEARCH & DEVELOPMENT REPORTS

1A. AERODYNAMICS

AD-444 088 **Field 1A, 14B**
CFSTI Price: HC$4.60
General Dynamics/Astronautics, San Diego, Calif. Space Science Lab.
FURTHER EXPERIMETAL AND THEORETICAL STUDIES OF UNDEREXPANDED JETS NEAR THE MACH DISC,
by L. D'Attorre, and F. Harshbarger. Jul 65, 45p GDA-DBE64-041
Contract AF 19 (628)-3268, ARPA Order-363

Descriptors: (*Flow visualization, Jets), (*Nozzle gas flow, Flow visualization), Orifices, Schlieren photography, Rocket motors, Nozzle throats, Guided missiles.

Results of experimental flow visualization studies in the neighborhood of the Mach disc in underexpanded, inviscid jets are presented. The cases include sonic orifices, conical nozzles, Foelsch coordinate nozzles, and some full scale, in flight missile data. The exit to ambient static pressure ratios go up to 300 and the ambient Mach numbers go up to 4.3. In each case studied the method of Bowyer, D'Attorre, and Yoshihara appears to provide a reasonable technique for predicting the size and axial position of the Mach disc. In addition it is shown that the curvature in the Mach disc must be considered if a consistent triple point calculation is to be made. (Author)

AD-465 312 **Field 1A, 9B**
CFSTI Prices: HC$4.60 MF$0.50
Army Missile Command, Redstone Arsenal, Ala. Structures and Mechanics Lab.
A DIGITAL PROGRAM FOR CALCULATING COMBINED AERODYNAMIC PARAMETERS-SUBSONIC AND SUPERSONIC,
by J. R. Sandlin. 3 May 65, 44p
AMC-RS-TR-65-4

Descriptors: (*Programming (Computers), Aerodynamics), (*Subsonic flow, Programming (Computers)), (*Supersonic flow, Programming (Computers)), Digital computers, Guided missiles, Aircraft.

A method is given to take into account the interactions of the various components of a missile or airplane using the combined aerodynamic parameters. This report presents an engineering aid whereby the text of NACA Report 1307 may be employed expediently, effectively, and accurately. (Author)

AD-634 562 **Field 1A, 20D**
CFSTI Prices: HC$2.00 MF$0.50
David Taylor Model Basin, Washington, D. C. Aerodynamics Lab.
LONGITUDINAL AERODYNAMIC CHARACTERISTICS OF SEVERAL HYPERSONIC AIRCRAFT CONFIGURATIONS AT A MACH NUMBER OF 6.26.
Research and development rept.,
by John R. Krouse, and Bertram K. Ellis. May 66, 42p Aero-1109
DTMB-2201

Descriptors: (*Wing-body configurations, Hypersonic characteristics), (*Hypersonic planes, *Hypersonic characteristics), Cylindrical bodies, Aerodynamic characteristics, Wind tunnel models, Delta wings, Conical bodies, Fuselages, Drag, Lift, Angle of attack, Model tests.

Wind-tunnel tests were conducted at a Mach number of 6.26 to determine the longitudinal aerodynamic characteristics of several conceptual hypersonic aircraft configurations, consisting of various half-cone-cylinder bodies and double-delta wings. Effects of body volume, vehicle orientation, wing planform, and wing-tip dihedral were determined. In general, the lift-to-drag ratios of all high-wing configurations varied slightly over an angle-of-attack range of 0 degrees to 12 degrees reaching maximum values of roughly 3.2 near 6 degrees. On the other hand, the lift-to-drag ratios of all low-wing configurations increased continuously with increasing angle of attack, eventually reaching maximum values of roughly 3.6 near 10 degrees. In all cases, fuselage base drag accounted for less than 10 percent of the total drag. For the arbitrarily chosen center-of-gravity location, all low-wing configurations were stable but unbalanced; whereas several high-wing configurations were both stable and balanced. (Author)

SC-DC-65-1907 **Field 1A, 20D**
CFSTI Prices: HC$3.00 MF$0.50
Rhodes and Bloxsom, Canoga Park, Calif.
HEAT TRANSFER AND FLOW VISUALIZATION ON 1/2-INCH-DIAMETER CYLINDERS IN LAMINAR HYPERSONIC FLOW.
Jan 66, 56p
Contract AT (29-1)-789

Descriptors: (*Hypersonic flow, Heat transfer), (*Heat transfer, Laminar flow).

For abstract, see N 20 12.

AD-445 978 **See Field 21B**

AD-447 153 **See Field 14B**

AD-455 149 **See Field 14B**

AD-634 146 **See Field 20D**

AD-634 736 **See Field 20D**

PB-169 457 **See Field 20D**

1B. AERONAUTICS

AD-452 177 **Field 1B**
CFSTI Prices: HC$4.60
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
HELICOPTER DOWNWASH BLAST EFFECTS STUDY,
by G. W. Leese. Oct 64, 43p TR-3-664

Descriptors: (*Downwash, Blast), (*Helicopters, Downwash), Hazards, Dust, Aviation safety, Aircraft landings, Take-off, Helicopter rotors, Tests, Soils, Velocity.

Field tests were conducted to determine downwash velocity profiles. In addition, tests utilizing scale-model rotor blades were made over wet and dry sands and a dry lean clay, and over a chemically stabilized soil, plastic-impregnated soils, and lightweight ground covers (membranes) to determine model-scale velocity profiles and air velocities at the ground surface required required to dislodge and move particles of various types of soil, the size of soil area requiring protection for various VTOL aircraft, and the effectiveness of membranes and soil stabilization in preventing dust-cloud formation. The downwash velocities along the ground surface cause soil-particle pickup, and dust hazard conditions will develop if these velocities exceed 1200 fpm over fine dry sand and 1800 fpm over dust-size particles of lean clay. Lightweight ground covers can alleviate dust in the landing and takeoff area of helicopters. A vertical lip around the edge of the membrane will reduce the size of membrane section needed. Certain soil stabilizers will alleviate dust formation under rotary-wing aircraft. (Author)

AD-634 191 **Field 1B, 5C**
CFSTI Prices: HC$3.00 MF$0.75
Rand Corp., Santa Monica, Calif.
CIVIL AVIATION IN COMMUNIST CHINA SINCE 1949,
by Harriett E. Porch. Jun 66, 82p RM-4666-PR
Contract AF 49 (638)-1700
TT-66-1470

Descriptors: (*Civil aviation, China), (*Air transportation, China), Aircraft industry, Economics, Political science, Aeronautics, State-of-the-art reviews.

A description of the development of both transport and specialized aviation (crop-dusting, fire patrols, express, etc.) since the Communist takeover. It includes discussions on organization, international and domestic routes and services, equipment, and civil aircraft manufacturing and purchases. It concludes that, while all services are grossly inadequate to serve China's huge land mass and population, the foundations have been laid for what appears to be a workable organization that can continue to grow as resources permit and special needs demand. (Author)

AD-634 154 **See Field 4B**

AD-634 644 **See Field 20A**

PB-169 544 **See Field 5B**

1C. AIRCRAFT

AD-634 216 **Field 1C, 11I, 11D, 14B K**
CFSTI Prices: HC$1.00 MF$0.50
Sea-Space Systems, Inc., Torrance, Calif.
MER J II BALLOON FLIGHTS: HIGH ALTITUDE BALLOON RESEARCH.
Final technical and analysis rept.,
by Dale W. Cox. May 66, 16p SSS-6013
Contract Nonr-4776 (00)
Proj. NR-211-095

Descriptors: (*Balloons, High altitude), (*Plastics, Balloons), Films, Polyester plastics, Flight testing, Composite materials, Reinforcing materials, Dacron.

Three 4,500,000 cu ft MER J II balloons were fabricated and flown during this program. The balloons were produced from very light weight, composite and plain balloon films, the tops of the balloons were made from MERFAB reinforced composite film, while the bottom skirt employed .00032 inch thick plain MER Film. LOADWEB seam construction was used to provide adequate strength in supporting a 500 lb payload. The balloons were capable of a theoretical performance of lofting a 150 lb payload to an altitude of 150,000 ft or a 500 lb payload to 137,000 ft. The first balloon reached an altitude of 72,000 ft, the second unit was lost in a launch accident; and the third balloon was ascending at 150 fpm at 86,000 ft when it was intentionally terminated. An analysis of problems and suggested solutions are made. (Author)

AD-634 243 **Field 1C, 14A**
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
METHODOLOGICAL PROBLEMS IN EVALUATING THE EFFECTIVENESS OF MILITARY AIRCRAFT DEVELOPMENT,
by Thomas K. Glennan Jr. May 66, 20p P-3357
Prepared for presentation at the National Meeting of the Operations Research Society of America (29th).

Descriptors: (*Aircraft, Production), (*Cost effectiveness, Aircraft), Costs, Time, Factor analysis.

Development time does not seem to have an important influence on development costs, at least within the range of development times in the sample. State-of-the-Art Advance, as determined by a group of experts, may have a negative relationship to development costs. This may be due to changes in the task goals which are not reflected in the variables. There is no evidence of productivity increases of the factors of development (if they have occurred) being taken out in the lowering of development costs. There is some evidence that

the coordination of subcontracting efforts may raise development costs, however, these costs appear to be largely associated with tooling and/or production. (Author)

AD-634 250 **Field 1C**
CFSTI Prices: HC$1.00 MF$0.50
Naval Air Development Center, Johnsville, Pa. Aero-Electronic Technology Dept.
A STANDARD AIRCRAFT WEAPONS MANAGEMENT AND RELEASE CONTROL SYSTEM (SAWMARCS) DESIGN PROPOSAL FOR THE F-111B AIRCRAFT.
Final rept.,
by R. H. Barnhart. 1 Jun 66, 21p NADC-AE-6616
Task RAV05J013/2021/F008-05-03

Descriptors: (*Fighters, Aircraft equipment), (*Aircraft ammunition, Control systems), Design, Weapon systems, Aircraft guns, Release mechanisms, Reliability, Circuits, Feasibility studies.

Identifiers: SAWMARCS, F-111 aircraft.

Some form of integrated weapons management system for Navy aircraft is feasible and essential to relieve the accumulating confusion and loss of reliability now occuring in Navy aircraft armament control systems. It is concluded that the well advanced stores management system being proposed by NAVAIRDEVCEN presents precedence setting solutions to many existing armament system problems. The general outline of a well advanced airborne stores management system describes a system for the F-111B that offers solutions to present and foreseeable future armament control system problems in the cockpit, in the avionics bay, on the flight deck, and in the maintenance system. The proposed NAVAIRDEVCEN SAWMARC system is an adequate solution for 1968 through 1970 Navy aircraft armament management system problems. (Author)

AD-634 502 **Field 1C**
CFSTI Prices: HC$4.00 MF$0.75
Army Aviation Materiel Labs., Fort Eustis, Va.
UH-1B HELICOPTER FLIGHT LOADS INVESTIGATION PROGRAM.
Engineering lab rept.,
by David Chestnutt, Louis Bartek, Larry E. Clay, and Joseph F. Braun. May 66, 125p
USAAVLABS-TR-66-46
Proj. DA-1P125901A14607
Task 65-15
Prepared in cooperation with Technology, Inc., Dayton, Ohio.

Descriptors: (*Helicopters, Performance (Engineering)), (*Loading (Mechanics), Helicopters), Statistical analysis, Data, Sampling, Operation, Flight, Gust loads.

Identifiers: UH-1B aircraft.

A 219-hour statistical sample of data was collected from four UH-1B helicopters performing normal field mission assignments covering a period of 3 months. The parameters monitored were: airspeed, altitude, outside air temperature, acceleration at the aircraft center of gravity, main rotor rpm, collective stick position, longitudinal cyclic stick position, and engine torque. Supplementary information for each flight included barometric pressure, type of mission, and aircraft gross weight. The data are presented as frequency-of-occurrence histograms, exceedance curves, and gust spectra. These figures and curves may be used to establish design criteria for new helicopters and for modification of design criteria for existing aircraft. (Author)

AD-634 503 **Field 1C, 21E**
CFSTI Prices: HC$3.00 MF$0.50
Army Aviation Materiel Labs., Fort Eustis, Va.
CH-54A SKYCRANE ENGINE LOAD SHARING.
Engineering lab. rept.,
by David Chestnutt, and L. R. Bartek. May 66, 54p USAAVLABS-TR-66-47
Proj. DA-1M121401D14415
Task EL-65-29

Descriptors: (*Helicopters, Performance (Engineering)), (*Helicopter engines, Loading (Mechanics)), Flight, Operation, Data, Analysis, Torque, Tables, Graphics.

Identifiers: CH-54A aircraft.

The engine load-sharing characteristics of the CH-54A Skycrane helicopter were investigated to determine if unequal load sharing would be a significant problem. Torque-split samples were selected from 67 hours of flight-load data. The parameters measured and recorded on oscillograph records were airspeed, altitude, engine gas producer rpm, engine torque, main rotor rpm, vertical acceleration at aircraft center of gravity, and outside air temperature. The gross weight at takeoff and landing and the barometric pressure were measured and recorded as supplemental data. The data were presented in a series of frequency-of-occurrence graphs; variation in torque splits was indicated with the other measured parameters. The analysis of the data indicates that the engine load splitting is significant at takeoff and landing and should be investigated further. (Author)

AD-634 548 **Field 1C**
CFSTI Prices: HC$4.00 MF$1.00
American Helicopter Society, Inc., New York.
PROCEEDINGS OF NATIONAL V/STOL AIRCRAFT SYMPOSIUM (1st), SUPPLEMENT, HELD 3-4 NOVEMBER 1965 AT WRIGHT-PATTERSON AFB, OHIO.
4 Nov 65, 143p

Descriptors: (*Vertical take-off planes, Symposia), (*Short take-off planes, Symposia), Design, Flight testing, Lift, Fans.

Identifiers: X-22 aircraft.

A description of the X-22A airplane and its systems is given including the special testing undertaken to prove these systems. Test progress and certain problem areas related to VTOL design are discussed. Test pilot participation in the pre-flight phases of the program and pilot preparation for first flights is described. Progress in ground test buildup to first flight is reported. Approach to first flight and development of V/STOL profiles is covered and the demonstration program including military participation is outlined. (Author)

AD-634 753 **Field 1C, 15E**
CFSTI Prices: HC$3.60 MF$0.50
American Power Jet Co., Ridgefield, N. J.
A METHOD FOR EVALUATING FAILURE AND USAGE DATA PATTERNS.
Feb 63, 36p APJ-283-2
Contract Nonr-3472 (00)

Descriptors: (*Naval aircraft, Maintenance), (*Aircraft, Maintenance), Mathematical models, Analysis of variance, Statistical tests, Logistics, Time, Reliability, Life expectancy.

The correct interpretation of logistical test results was sought for use in determining whether to maintain or repair aircraft. The technique is a multiplicative form of three factors for the true or 'inherent' maintenance measurement, as modified by a possible effect due to time and a possible effect due to the number for the aircraft assigned by the bureau of the Navy Department.

AD-634 754 **Field 1C, 15E**
CFSTI Prices: HC$5.60 MF$0.75
American Power Jet Co., Ridgefield, N. J.
MAINTENANCE-REPAIR DECISIONS. FAILURE, UNSATISFACTORY, OR REMOVAL ANALYSIS,
by Herbert J. Lieberman. Feb 63, 60p APJ-283-3
Contract Nonr-3472 (00)

Descriptors: (*Naval aircraft, Maintenance), (*Aircraft equipment, Maintenance), Helicopters, Clutches, Magnetos, Gyroscopes, Reliability, Life Expectancy.

The report examines the potential of NAVAER Form 3069, 'Failure, Unsatisfactory, or Removal Report' (FUR), as a source of failure and usage information, and the application of this information to Maintenance/Repair decisions. The development of this information is illustrated by statistical studies of FUR data for three typical components of the HSS-1/HUS helicopter. CONCLUSIONS: The FUR presents a convenient single source of data for repairable and exchange items covering approximately three years of experience. Almost all FURs are initiated at squadron level. The informational value of the FUR is strongest in establishing a circumstance under which the FUR was noticed, and is weakest in the determination of causes of failure. The data reported on the FUR overlap, to varying degrees, those recorded on other Navy forms, e.g., Maintenance Usage Data Report and NAVAER 418-A. (Author)

AD-634 765 **Field 1C, 14B**
CFSTI Prices: HC$4.00 MF$0.75
Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
PROCEEDINGS, AFCRL SCIENTIFIC BALLOON WORKSHOP, 1965.
Special repts.,
by Arthur O. Korn Jr. May 66, 116p AFCRL-SR-45, AFCRL-66-309
Proj. AF-6665
Task 666501

Descriptors: (*Balloons, Symposia), Reports, Polyethylene plastics, Polyester plastics, Films, Reinforcing materials, Abstracts, Flight, Wind, Materials, Recovery, Tracking, Creep, Performance (Engineering).

The AFCRL Scientific Balloon Workshop was held in September 1965 for the purpose of exchanging information on recent developments in balloon materials, designs, launching techniques, and flight control. In addition to informal meetings of small groups and panel discussions, 13 prepared talks were presented, of which 10 are contained herein. Subjects include: analyses of flight statistics, Strato-Film flight results, methods for testing balloon materials, creep failure theory, tandem balloon systems, and balloon recovery systems. (Author)

N66-15281 **Field 1C**
CFSTI Prices: HC$3.00 MF$0.75
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
RECENT SUPERSONIC TRANSPORT RESEARCH,
by W. J. Alford Jr, and C. Driver. 1965, 65p
NASA-TM-X-54982

Descriptors: *Supersonic transport, *Transport aircraft, *Aircraft structure, *Flight control, *Stability and control.

For abstract, see T 66 15.

PB-169 446 **Field 1C, 9C**
CFSTI Prices: HC$1.60 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
INSTANTANEOUS OVERVOLTAGE PROTECTION FOR AIRCRAFT A.C. GENERATORS,
by R. L. A. McKenzie, and R. F. Sims. Jul 65, 18p
Technical rept. no. TR-65146

Descriptors: (*Voltage regulators, Alternating current), (*Aircraft equipment, Generators), Great Britain, Power supplies, Time-delay relays, Switching circuits, Power equipment parts.

Overvoltage protection in current use on aircraft a.c. systems incorporates a substantial time delay to avoid unwanted tripping with transient voltage

rises due to switching etc. Consequently, on the occurrence of a genuine fault, consuming equipment is subjected to an excessive voltage for a considerable time before the fault is cleared. By making overvoltage protection depend on the direction of the change of alternator excitation current as well as on the voltage level, overvoltage faults may be cleared with no deliberate time delay and with no danger of inadvertent operation due to load switching or fault clearance. The circuit and testing of such a form of overvoltage protection are described. (Author)

PB-170 403 **Field 1C**
CFSTI Prices: HC$7.60 MF$0.75
Kaman Aircraft Corp., Bloomfield, Conn.
A STUDY OF TWIN-ENGINE AIRPLANE PROPELLER INTERCONNECTION.
Final rept.,
by Robert B. Bossler Jr. Jan 66, 72p
Contract FA-65-WA-1385
FAA-ADS-59

Descriptors: (*Propellers (Aerial), Shafts), (*Drive shafts, Propellers (Aerial)), Aviation safety, Aircraft engines, Thrust, Shaft couplings, Failure (Mechanics), Performance (Engineering), Feasibility studies.

Identifiers: Aero Commander 680F.

A feasibility study was made of cross-shafting systems which would interconnect propellers of light, twin-engine airplanes, eliminating asymmetric thrust caused by single-engine failures. The study found conventional engine-propeller arrangement, with interconnection added, superior to fuselage-mounted multiengine drive of interconnected wing-mounted propellers. Reliability analysis shows that interconnection, on the average, will eliminate approximately six accidents while adding one, a reduction of 84 percent of those accidents associated with engine failure. It is concluded that this concept is feasible and makes a significant contribution to flight safety. (Author)

AD-272 647 **See Field 17H**

AD-634 146 **See Field 20D**

AD-634 525 **See Field 19D**

PB-169 219 **See Field 17H**

1D. AIRCRAFT FLIGHT CONTROL AND INSTRUMENTATION

AD-634 575 **Field 1D, 5E**
CFSTI Prices: HC$3.00 MF$0.75
Technical Information and Library Services, Ministry of Aviation, London (England).
AN ANNOTATED BIBLIOGRAPHY OF PRESENTATION OF INFORMATION IN AIRCRAFT COCKPITS,
by J. G. Fox, I. Ferguson, and I. D. C. Andrew.
May 66, 80p CoA-Memo-M/P-73
Proj. MOA-PD/28/030
TIL-S/T-Memo-3/66

Descriptors: (*Bibliographies, *Flight instruments), Cockpits, Design, Abstract, Display systems, Human engineering, Pilots, Training.

Lists references to reports and published papers on all aspects of presenting information to pilots. Abstracts are given of work particularly relevant to cockpit instrument design. Only work reported since 1940 is listed; for earlier work the reader is referred to 'A History of Aircraft Cockpit Instrumentation' by Nicklas (1958). References are listed alphabetically by author under six broad headings:-General; Methodology and Criteria; Pilot requirements; Display presentation; System presentation; and Pilot acceptance and training. The possibilities and directions for future research are discussed. (Author)

AD-479 217 **See Field 22B**

1E. AIR FACILITIES

AD-634 530 **Field 1E**
CFSTI Prices: HC$6.00 MF$1.25
LTV Aerospace Corp., Dallas, Tex. LTV Vought Aeronautics Div.
DETERMINATION OF CHARACTERISTIC NON-DIMENSIONAL LOAD STROKE DIAGRAMS FOR SHIPBASED AND SHOREBASED CATAPULTING AND ARRESTING GEAR FROM ANALYSIS OF AIRPLANE AND DEAD LOAD TEST DATA.
Final rept.,
by R. G. Peterson. 9 Jun 66, 205p Rept. no. 2-53470/6R-2259
Contract NOw-64-0369-f

Descriptors: (*Catapults, Loading (Mechanics)), (*Arresting gear, Loading (Mechanics)), Performance (Engineering), Naval equipment, Statistical analysis, Data, Tables, Graphics.

Characteristic loading and performance behavior of Navy shipbased and shorebased launching and recovery gear are presented in this report. These were determined through analysis of a large number of test records obtained from the Naval Air Engineering Laboratory (Ship Installation), Philadelphia, Pennsylvania. Statistical methods were employed to determine expected values and tolerance limits of loading and performance behavior based on probability of occurrence. Results of the analyses are presented in tabulated and graphical form. Examples are given to show practical application of the data. Physical descriptions of the various shipbased and shorebased catapulting and arresting gear are given, including operational procedures and a discussion of the causes of load and performance variations for supposedly identical type operations. (Author)

AD-634 614 **Field 1E, 13B**
CFSTI Prices: HC$3.00 MF$0.75
Ohio River Div. Labs., Cincinnati.
BASIS OF RIGID PAVEMENT DESIGN FOR MILITARY AIRFIELDS,
by R. L. Hutchinson. May 66, 77p Miscellaneous paper-5-7

Descriptors: (*Runways, Design), (*Pavements, Design), (*Landing fields, Pavements), Loading (Mechanics), Stresses, Reinforced concrete, Thickness, Numerical analysis, Aircraft, Traffic.

The paper was organized to present the various factors which influence the current design criteria with a brief explanation of how the numerical values of each was derived.

AD-634 382 **See Field 17G**

2B. AGRICULTURAL ECONOMICS

PB-170 260 **See Field 5C**

PB-170 302 **See Field 5C**

PB-470 332 **See Field 5C**

2E. ANIMAL HUSBANDRY

ORO-635 **See Field 6R**

2F. FORESTRY

AD-634 565 **Field 2F, 4B**
CFSTI Prices: HC$3.00 MF$0.75
Pacific Southwest Forest and Range Experiment Station, Berkeley, Calif.
CRITICAL FIRE WEATHER PATTERNS, THEIR FREQUENCY AND LEVELS OF FIRE DANGER,
by Melvin K. Hull, Clyde A. O'Dell, and Mark J. Schroeder. 1966, 54p
Contract OCD-PS-65-27

Descriptors: (*Forest fires, *Weather forecasting), (*Fire safety, Forest fires), Rural areas, Urban areas, Climatology, Meteorology, Fire safety, Forestry.

Weather is one of the dominant factors responsible for uncontrollable spread of mass fires in both urban and rural areas. Identification of the weather types causing critical burning conditions in 14 contiguous regions of the United States was the subject of the previous report. But to be of much practical value, knowing what the critical weather types are and where they influence burning conditions adversely is not enough. We must also know when they will occur and the type of weather and burning conditions that can be expected. This study is a step in that direction. Ten years of synoptic weather maps (1951-1960) were studied to determine the frequency of occurrence of each of 21 critical fire-weather types, by months, on a year-round basis. Next, various statistics were computed showing mean values and variations of weather parameters and fire danger indexes, by type and month, at each of a network of 89 representative cities. Using these data as a climatology reference, fire-weather forecasters should be able to make a first approximation probability statement about the occurrence of a particular weather event. (Author)

PB-170 273 **See Field 5C**

PB-170 274 **See Field 5C**

PB-170 437 **See Field 5B**

3A. ASTRONOMY

AD-634 379 **Field 3A**
CFSTI Prices: HC$1.00 MF$0.50
Directorate of Scientific Information Services, Ottawa (Ontario).
RELATIVE DEPTHS OF LUNAR RING MOUNTAINS AND CRATERS IN THE MARE NUBIUM,
by A. V. Markov. May 66, 4p T-457-R
TT-66-61510
Trans. of Akademiya Nauk SSSR. Doklady, v167 n1 p63-4 1966.

Descriptors: (*Moon, *Extraterrestrial topography), Mountains, Lunar environment, Lunar probes, Photogrammetry, USSR, Canada.

Identifiers: Lunar craters, Mare Nubium, Ranger spacecraft.

Baldwin, in 1949, gave the following formula for expressing the relationship between the diameter D and depth d of lunar craters: $\lg D = 0.1083 (\lg d)^2 + 0.8035 \lg d + 0.6200$. Data taken from Ranger VII photographs of the Mare Nubium region now establish that this equation is fairly close representation of actuality.

N66-15319 **Field 3A**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
CALIBRATION OF THE HERTZSPRUNG- RUSSEL DIAGRAM IN TERMS OF AGE AND MASS FOR MAIN-SEQUENCE B AND A STARS,
by T. Kelsall, and B. Stromgren. 1965, 37p
NASA-TM-X-56081
Contract Nonr-1858

Descriptors: *B Star, *Main sequence star, *Age factor, *Calibration, *Hertzsprung-Russell diagram.

For abstract, see T 66 15.

N66-15613 Field 3A
CFSTI Prices: HC$1.00 MF$0.50
Manchester Univ. (England).
PHOTOGRAPHIC OBSERVATIONS OF LUNAR SURFACE FROM JAPAN.
Final rept. 15 Feb-15 Aug 65,
1965, 10p
Grant NsG-297-63
NASA-CR-69485

Descriptors: *Astronomy, *Japan, *Lunar photography, *Observatory.

3B. ASTROPHYSICS

AD-634 303 Field 3B
CFSTI Prices: HC$1.00 MF$0.50
Boeing Scientific Research Labs., Seattle, Wash. Geo-Astro Physics Lab.
ON THE NONUNIFORM COOLING BEHAVIOR OF THE ECLIPSED MOON,
by D. F. Winter. May 66, 10p D1-82-0531

Descriptors: (*Moon, Cooling), Astrophysics, Lunar eclipses, Extraterrestrial topography, Heat transfer, Surface properties, Theory.

Identifiers: Selenology.

Anomalous cooling of certain regions of the Moon during an eclipse may be attributable to preferential surface roughness on a centimeter scale. Several arguments are presented in support of this hypothesis and a quantitative illustration is displayed. Implications with regard to lunar crater evolution are discussed briefly. (Author)

AD-634 501 Field 3B, 8B
CFSTI Prices: HC$3.00 MF$0.75
Arizona Univ., Tucson. Lunar and Planetary Lab.
COMMUNICATIONS OF THE LUNAR AND PLANETARY LABORATORY, VOLUME 4, PART 2,
by D. W. G. Arthur. 1965, 60p Communications 60-62
Contract AF 19 (628)-4332

Descriptors: (*Moon, *Photogrammetry), Extraterrestrial topography, Mapping, Position finding, Lunar environment, Astronomical data.

Identifiers: Selenodetics.

Contents: The reduction of measures for position on a single lunar photograph; selenodetic measures on Yerkes Lunar Photograph No. 1170; the computation of selenodetic coordinates using the librations.

N66-14551 Field 3B
CFSTI Prices: HC$3.00 MF$0.75
Smithsonian Astrophysical Observatory, Cambridge, Mass.
ANALYTICAL DEVELOPMENT OF THE PLANETARY DISTURBING FUNCTION ON A DIGITAL COMPUTER,
by B. Benima, I. G. Izsak, and S. B. Mills. 1964, 65p SAO-Special Rept.-164
Contract NSG-87-60
NASA-CR-69093

Descriptors: *Disturbing function, *Fortran, *IBM 7094 computer, *Planet.

For abstract, see T 66 15.

N66-15244 Field 3B
CFSTI Prices: HC$3.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
THE HELIUM CONTENT OF THE GALAXY,
by A. G. W. Cameron. 1964, 52p NASA-TM-X-56132

Descriptors: *Galaxy, *Interstellar material, *Helium, *Stellar evolution, *Time factor.

N66-16379 Field 3B
CFSTI Prices: HC$1.00 MF$0.50
Brandeis Univ., Waltham, Mass. Astrophysics Inst.
ON RETARDED EVOLUTION OF PROTOSTARS.
Doctoral thesis,
by J. A. Burke. Jun 65, 27p
Grant NsG-540
NASA-CR-69858

Descriptors: *Stellar evolution, *Celestial mechanics, *Protostar, *Restraint.

AD-634 608 See Field 6R

3C. CELESTIAL MECHANICS

PB-170 284 Field 3C, 8H CF
CFSTI Prices: HC$4.00 MF$1.00
Maguire (Charles A.) and Associates, Engineers, Providence, R. I.
FEASIBILITY OF INDUSTRIAL SITE RECLAMATION IN THE MOSHASSUCK RIVER VALLEY PAWTUCKET, RHODE ISLAND.
Jul 65, 137p
Contract Cc-6035

Descriptors: (*Economics, Rhode Island), (*Rhode Island, Economics), (*Site selection, Rhode Island), Industries, Water pollution, Water supplies, Rivers, Roads, Railroads, Drainage, Soils.

Identifiers: Area redevelopment.

The chief objectives of the report were to conduct studies pertaining to the ultimate development of an industrial area with particular reference to hydrologic, hydraulic, and soils and foundations conditions from the points of view of providing for flood protection, stream control and the elimination of stream pollution, and the consideration of site preparation requirements and techniques. The conclusions are that the locations of the river, railroad and the principal highway involved should be confined to a single narrow corridor and that extensive earthmoving and corrective soils measures, and drainage works will be necessary to achieve a satisfactory site.

AD-634 291 See Field 22C

PB169 455 See Field 22C

4A. ATMOSPHERIC PHYSICS

AD-402 842 Field 4A, 20N, 20F
CFSTI Price: HC$2.60
Lincoln Lab., Mass. Inst. of Tech., Lexington.
PRELIMINARY STUDY OF THE EFFECT OF OZONE ON ATMOSPHERIC TRANSMISSION IN THE RANGE 0.25 MICRON TO 0.60 MICRON,
by J. H. Meyer, and R. E. Newell. 19 Feb 63, 25p 32G-2
Contract AF 19 (628)-400, ARPA Order-166

Descriptors: (*Ozone, Atmospheric sounding), (*Atmospheric sounding, Ozone), Optical equipment, Atmosphere entry, Atmosphere, Absorption, Scattering, Ultraviolet radiation, Reentry vehicles, Measurement, Spectrophotometers, Wave transmission, Airborne.

The Project PRESS airborne optical program employs instrumentation having a spectral coverage from 0.25 micron to 15 microns. In relation to PRESS optical measurements, computation of atmospheric transmission in the range 0.25 to 0.60 micron were performed to find the effects of the presence of atmospheric ozone. Graphical and tabular presentations of the transmission through a selected vertical distribution of ozone, which is representative of low latitudes, are given for various target-to-aircraft horizontal distances and for numerous look-angles. The transmission versus wavelength curves show the known atmospheric opaqueness to ultraviolet radiation in the range 0.25 to 0.29 micron. The transmission versus look-angle curves show that maximum absorption, for the particular vertical distribution of ozone used, is experienced between look-angles of eight to ten degrees. This infers that maximum absorption will take place when the PRESS optical instrumentation is recording re-entry phenomena between the heights of 200,000 and 100,000 feet and at a horizontal distance of 80 nautical miles perpendicular to the trajectory. Because of the lack of information about the vertical distribution of ozone at low latitudes, it is recommended that actual measurements be made in the vicinity of Kwajalein prior to the PRESS experiments. (Author)

AD-634 262 Field 4A, 8N
CFSTI Prices: HC$1.00 MF$0.50
Boeing Scientific Research Labs., Seattle, Wash. Geo-Astro Physics Lab.
HYDROMAGNETIC EMISSIONS AT THE GEOMAGNETIC POLES,
by E. M. Wescott, V. P. Hessler, and J. F. Kenney. May 66, 11p D1-82-0534
Also available from author. Prepared in cooperation with Alaska Univ., College. Geophysical Inst.

Descriptors: (*Magnetohydrodynamics, *Atmospherics), Meteorological phenomena, Terrestrial magnetism, Antarctic regions.

A micropulsation experiment has been in operation since December 1964 near the magnetic poles at Camp Tuto, Greenland, and Vostok, Antarctica. The purpose of the experiment is to investigate the character of micropulsation activity in the polar region, where field line conjugacy probably does not exist. Examples of some 'pearl' micropulsations observed simultaneously at the two sites are given. Preliminary measurements of the delay time between reception of pearls at College, Alaska and Camp Tuto, Greenland indicate that these emissions originate in the auroral zone and propagate away from that region in an ionospheric duct. (Author)

AD-634 299 Field 4A, 14B
CFSTI Prices: HC$3.00 MF$0.75
American Science and Engineering, Inc., Cambridge, Mass.
INSTRUMENTATION TO MEASURE THE RATE OF ION PRODUCTION IN THE UPPER ATMOSPHERE DURING AN AURORA.
Final scientific rept., 15 May-14 Nov 65,
by Edwin R. Hedblom, William P. Reidy, and Clifton Doiron. 22 Apr 66, 75p ASE-1244
Contract AF 19 (628)-5178
Proj. AF-5710
AFCRL-66-301

Descriptors: (*Ionization chambers, *Atmospheric sounding), (*Aurora, Ionization), Upper atmosphere, Measurement, Reaction kinetics, Sounding rockets, Ions.

An ion chamber designed to measure the rate of ionization in the upper atmosphere during an aurora is described. The details of the instrument's design, operation, and calibration are presented. The flights of two ion chambers on two Astrobee 200 rockets launched from Fort Churchill, Manitoba, Canada, in January 1966 are described in detail. (Author)

AD-634 358 Field 4A, 20I, 20N
CFSTI Prices: HC$3.00 MF$0.50
Iowa Univ., Iowa City. Dept. of Physics and Astronomy.
NEGATIVE ION DETECTION IN THE IONOSPHERE FROM EFFECTS ON ELF WAVES.
Research rept. Jul 65-Mar 66,
by Stanley D. Shawhan. Mar 66, 54p Rept. no. 66-11
Contracts Nonr-1509 (06), N9onr-93803

Descriptors: (*Electromagnetic waves, *Ionospheric propagation), (*Ions, Atmospherics), (*Atmospherics, Magnetohydrodyn-

amics). Very low frequency, Wave transmission, Magneto-optic effect, Refractive index, Plasma physics, Atmospheric sounding.

The theory for propagation of small amplitude electromagnetic waves in a cold, homogeneous plasma including negative ions and immersed in a uniform, static magnetic field is developed. It is found that for longitudinal propagation each negative ion introduces a resonance at the negative ion gyrofrequency, a concentration dependent cutoff frequency above the negative ion gyrofrequency, and possibly a crossover frequency depending on the ion concentrations and charge to mass ratios. At both the gyrofrequency and the cutoff frequency the group refractive index becomes infinite. Between these two frequencies there is a 'nose' frequency for which the group refractive index is a minimum. Examples are given for a three and five component plasma. Application of this negative ion theory is made to propagation of negative ion whistlers in the ionosphere. It is found that for frequencies near the negative ion gyrofrequencies the WKB approximation is valid above 300 KM during the nighttime and 150 KM during the daytime. Effects of collisions can be neglected above 150 KM. An ideal experiment is proposed for observation of negative ion whistlers (1-1000 cps). Sample whistler, frequency-time spectrograms like those which would be observed with such an experiment are sketched. From the distinctive frequencies on these sample spectrograms, it is shown that the negative ion specie and concentration can be determined using the developed cold plasma expressions. (Author)

AD-634 359 **Field 4A, 22B**
CFSTI Prices: HC$3.00 MF$0.75
Iowa Univ., Iowa City. Dept. of Physics and Astronomy.
THE TEMPORAL VARIATIONS OF ELECTRON INTENSITIES AT LOW ALTITUDES IN THE OUTER RADIATION ZONE AS OBSERVED WITH SATELLITE INJUN 3.
Progress rept.,
by John D. Craven. Apr 66, 75p Rept. no. 66-12
Contracts Nonr-1509 (06), N9onr-93803

Descriptors: (*Van Allen radiation belt, *Electron density), Periodic variations, Electrons, Intensity, Space environmental conditions, Atmospheric sounding, Scientific satellites, Astrophysics, Geophysics.

Identifiers: Injun.

Temporal variations of the intensities of electrons (E > 40 keV, > 230 keV, > 1.6 MeV) trapped in the outer radiation zone in the region 3.0 < or± L < or = 6.0 and mirroring at altitudes of approximately 1500 km have been studied during a seven-month period from January 1 to July 31, 1963, by means of three Geiger-Mueller tubes on-board the U. of Iowa/Office of Naval Research research satellite Injun 3. From observations during some twenty geomagnetically disturbed periods, it is shown that the largest intensity variations occur at the onset of such disturbances and that subsequent behavior is dependent on the magnitudes of the disturbances as measured by the maximum daily sums of the planetary magnetic disturbance parameter, K sub p. The time histories of these intensity variations are compared with those of 3-hour averages of the horizontal component of the geomagnetic field at College, Alaska (L = 5.5), for several disturbed periods. (Author)

AD-634 372 **Field 4A, 20N**
CFSTI Prices: HC$2.00 MF$0.50
Mitre Corp., Bedford, Mass.
THE ABILITY TO PREDICT LOW-ANGLE HEIGHT ERRORS WITH THE NBS SURFACE-CORRECTED MODEL ATMOSPHERE,
by Lyall G. Rowlandson. Jun 66, 37p MTR-113
Contract AF 19(628)-5165
Proj. AF-7010
ESD-TR-66-83

Descriptors: (*Atmospheric refraction, *Radio waves), Troposphere, Refractive index, Mathematical prediction, Radiosondes, Telemetering data, Atmosphere models.

A comparison is made between values of radio ray bending which is calculated in two ways: one using a ray-tracing computation based on radiosonde data; and the other using the National Bureau of Standards exponential reference atmosphere (1959) corrected to match the refractivity measured at the surface. The refractivity data for the ray-tracing computations were obtained from twice-daily radiosonde soundings taken at Albany, New York, and Nantucket, Massachusetts, during July and November 1963. Results indicate that the NBS model does not completely remove height errors, but it can be used effectively to offset errors due to slow seasonal changes bin ending conditions. The correction technique is not effective during periods of anomalous propagation. A review of more recent prediction techniques (1963) is presented, and recommendations are made for their field evaluation. (Author)

AD-634 704 **Field 4A, 20H**
CFSTI Prices: HC$1.00 MF$0.50
Maryland Univ., College Park. Dept. of Physics and Astronomy.
ORIGIN AND LOSS OF INNER ZONE PROTONS.
Technical rept.,
by A. M. Lenchek. Aug 65, 24p TR-524

Descriptors: (*Van Allen radiation belt, *Protons), (*Upper atmosphere, Protons), Cosmic rays, Albedo (Astronomy), Decay schemes, Nuclear scattering, Energy, Fast neutrons, Electromagnetic fields, Particle trajectories.

The first particles detected in the Van Allen radiation belt were energetic protons near L = 1.2. The suggestion made by Singer that the radiation consisted of protons in the 100-Mev range generated by the decay of cosmic ray albedo neutrons seems still to be valid. The theory is able to account for observations to better than an order of magnitude. However, the region of space in which the theory works is very small, less then one percent of the magnetosphere. Scattering by hydromagnetic waves seems to limit stable trapping to this small region above the magnetic equator. Low energy protons of unknown origin are superimposed on the proton belt of cosmic ray albedo origin. (Author)

AD-634 729 **Field 4A, 20N**
CFSTI Prices: HC$3.00 MF$0.75
Illinois Univ., Urbana. Electrical Engineering Research Lab.
IONOSPHERIC RESEARCH.
Quarterly progress rept. no. 10, 1 Jan-31 Mar 66,
by H. D. Webb. Jun 66, 58p
Contract DA-36-039-AMC-03703 (E)
Proj. DA-3A99-20-001-04
ECOM-03703-10
Document includes Appendix, A Conical Log-Spiral Antenna Design for use at 150 Megacycles, by John Lawrence Geisinger. See also AD-629 449.

Descriptors: (*Ionosphere, Atmospheric sounding), (*Atmospheric sounding, *Magneto-optic effect), Moon, Very high frequency, Ultrahigh frequency, Electromagnetic wave reflections, Solar disturbance, Ionospheric disturbances, Electron density, Radio equipment.

Moon-reflected signals were received on 150.6 mc and 413.25 mc on 36 days during the quarter. Data have not been analyzed for correlations with magnetic and solar activity which occurred during the times of observation. A phase-lock receiver, designed to stay tuned to the incoming moon-reflected signals at 150.6 mc, is working well. Small errors in antenna position, both at the transmitter and at the receiver, lead to errors in Faraday rotation angle at 413.25 cm, which can cause erroneous resolution of the n X 180 degree ambiguity. When observations are made for one or two hour periods these errors tend to cancel. A thesis for the M.S. degree, by Capt. J. L. Geisinger, dealing with the design of circularly polarized antennas for 150 mc, is appended. (Author)

AD-634 775 **Field 4A, 20A**
CFSTI Prices: HC$2.00 MF$0.50
Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
AIRCRAFT-INDUCED IONOSPHERIC DISTURBANCES.
Air Force surveys in geophysics,
by Frank A. Marcos. Apr 66, 34p AFCRL-AFSG-175, AFCRL-66-229
Proj. AF-4691
Task 469101

Descriptors: (*Acoustics, *Ionosphere), Supersonic planes, Supersonic flight, Shock waves, Propagation, Ionospheric disturbances, Atmospheric sounding, Probes, Electromagnetic wave reflections, High frequency, Radio waves.

Experiments were conducted to determine whether acoustic waves could propagate from the lower atmosphere into the ionosphere and be detected by hf radio waves. A supersonic aircraft was flown on a trajectory designed to focus the shock wave energy, generated over a long flight path, into a relatively small region of the daytime E-layer which was being probed by a phase path vertical sounder. Three series of tests, consisting of four flights each, were made. In each series, perturbations were found in the frequency spectrum of reflected radio waves that could be well correlated with the expected disturbance from aircraft-generated shock waves. (Author)

N66-16077 **Field 4A**
CFSTI Prices: HC$3.00 MF$0.75
Lockheed Missiles and Space Co., Palo Alto, Calif. Research Labs.
STUDIES OF THE STRUCTURE OF THE IONOSPHERE.
Final rept.
1965, 78p LMSC-8-26-65-1
Contract NASW-342
NASA-CR-69707

Descriptors: *Mass spectrometer, *Ion trap, *Ionospheric sounding.

For abstract, see T 66 15.

N66-16084 **Field 4A**
CFSTI Prices: HC$3.00 MF$0.75
Schjeldahl (G. T.) Co., Northfield, Minn.
THEORETICAL STUDY AND ENGINEERING DEVELOPMENT OF JIMSPHERE WIND SENSOR.
Final rept. 27 Feb 64-1 Jun 65,
by C. V. Eckstrom. Jul 65, 98p
Contract NAS8-11158
NASA-CR-69714

Descriptors: *Flight test, *Flow separation, *Meterological balloon, *Wind measurement.

SC-DC-65-1701 **Field 4A**
CFSTI Prices: HC$3.00 MF$0.75
Hittman Associates, Inc., Baltimore, Md.
THE DEVELOPMENT OF A DYNAMIC THREE-DIMENSIONAL ATMOSPHERIC MODEL FOR USE IN THE STUDY OF THE SELECTIVITY OF ORBITAL DECAY (TASK III),
Jul 65, 79p
Contract AT (29-1)-789

Descriptors: (*Atmosphere models, Selection), (*Upper atmosphere, Atmosphere models).

AD-443 779 See Field 4B

AD-443 875 See Field 8N

AD-634 228 See Field 7D

AD-634 312 See Field 7D

AD-634 380 See Field 8G

AD-634 500 See Field 20I

BNWL-36 See Field 7E

PB-169 889 See Field 20H

SC-RR-65-491 See Field 6R

4B. METEOROLOGY

AD-290 821 **Field 4B**
CFSTI Price: HC$3.60
General Mills Inc., Minneapolis, Minn.
TROPICAL UPPER AIR STUDIES.
Quarterly progress rept. no. 1, 23 Mar-31 Aug 62, by A. D. Belmont, and D. G. Dartt. 1 Sep 62, 37p GMI-2333
Contract DA-36-039-sc-89211
Proj. DA-3A99-27-005-09

Descriptors: (*Wind, Stratosphere), Tropical regions, Periodic variations, Harmonic analysis, Statistical analysis.

Considerable stratospheric upper-air data have been gathered and summarizing programs have been prepared for their computer analysis. The 26-month and 12-month cycles of tropical winds have been examined for Balboa, San Juan, Canton and Kwajalein. Harmonic and spectral analyses of 50-mb data show the relative importance of these and other periods and how they vary with latitude. Time sections of the zonal wind component were prepared for the same four stations. These show the variation of the observed waves with height, time and station. The consolidated long-term annual mean wave at stations about 10 degrees from the equator was found to be somewhat sinusoidal but waves for individual years were usually far from sinusoidal. At stations near the equator where the biennial cycle of 21 to 28 months is most pronounced, the shape of the annual wave could not be determined with the length of record available due to the very strong influence of the biennial cycle. (Author)

AD-296 036 **Field 4B**
CFSTI Price: HC$4.60
Travelers Research Center, Inc., Hartford, Conn.
RELATIONSHIPS BETWEEN TROPICAL PRECIPITATION AND KINEMATIC CLOUD MODELS.
Quarterly progress rept. no. 2, 1 Aug-31 Oct 62, by Edwin Kessler III, Pieter J. Feteris, and Edward A.Newburg. 31 Oct 62, 42p Rept. no. 7048-49
Contract DA-36-039-sc-89099
Proj. DA-3A-99-27-005

Descriptors: (*Atmospheric precipitation, Atmosphere models), Partial differential equations, Convection, Clouds, Meteorological parameters, Tropical regions, Feasibility studies.

A system of conservation equations embodying conversion of cloud to precipitation and cloud collection by precipitation are examined. The steady precipitation rate at the base of a model updraft column is shown to be a maximum when cloud conversion and collection are complete above the level of nondivergence and zero below that level. The decrease of saturation vapor density with height, characteristic of the atmosphere, implies that for any cloud-water content, there is a level (compensation level) above which the cloud density decreases with ascending motion, and conversely. For a particular choice of the magnitude of cloud collection, the precipitation rate at the ground and its time of onset is rather insensitive to the rate of cloud conversion. The efficiency of precipitation production at the earth's surface by transient disturbances in a saturated model atmosphere decreases with increasing speed of the updraft. Paths for further study of the role of cloud conversion and cloud collection processes for the initiation of precipitation are indicated. The difference between the horizontal speed of raindrops and the horizontal wind speed is almost always less than 1% of representative horizontal winds. (Author)

AD-297 797 **Field 4B**
CFSTI Price: HC$2.60
General Mills Inc., Minneapolis, Minn.
TROPICAL UPPER AIR STUDIES.
Quarterly progress rept. no. 2, 1 Sep-31 Dec 62, by D. G. Dartt, and A. D. Belmont. 1 Jan 63, 30p GMI-2361
Contract DA-36-039-sc-89211
Proj. DA-3A99-27-005-09

Descriptors: (*Wind, Upper atmosphere), (*Upper atmosphere, Wind), Meteorological parameters, Meteorology, Tropical regions.

AD-402 766 **Field 4B**
CFSTI Price: HC$3.60
Travelers Research Center, Inc., Hartford, Conn.
RELATIONSHIPS BETWEEN TROPICAL PRECIPITATION AND KINEMATIC CLOUD MODELS.
Quarterly progress rept. no. 3, 1 Nov 62-31 Jan 63,
by Edwin Kessler III, and Pieter J. Feteris. 31 Jan 63, 34p Rept. no. 7048-65
Contract DA-36-039-sc-89099
Proj. DA-3A-99-27-005

Descriptors: (*Atmospheric precipitation, Atmospheric models), Partial differential equations, Convection, Clouds, Meteorological parameters, Tropical regions, Feasibility studies.

A set of equations describing kinematical relationships among cloud, precipitation, and the wind field are derived in detail. Steady-state profiles of cloud in a non-precipitating tropical atmosphere are presented for 10 C steps of the condensation level; the unresponsiveness of cloud content to vertical air displacements at high altitudes and low temperatures is an explanation for the relative presistence of cirrus clouds. Exact solutions are presented for a cloud and precipitation model that is simplified to include only the problem of precipitation initiation. This model shows that where two processes for precipitation formation exist, the onset of precipitation is controlled only within certain limits by alteration of one of the processes. Microphysical parameters influence transient features of the development of precipitation and cloud. In many cases, however, the steady-state surface precipitation rate is only slightly responsive to order-of-magnitude changes of the microphysical parameters. (Author)

AD-413 944 **Field 4B, 22B**
CFSTI Price: HC$14.60
Stanford Research Inst., Menlo Park, Calif.
INVESTIGATION OF THE OPERATIONAL USE OF CLOUD PHOTOGRAPHS FROM WEATHER SATELLITES IN THE NORTH PACIFIC.
Final rept.,
by Sidney M. Serebreny, Eldon I. Wiegman, and Rex G. Hadfield. Nov 62, 144p
Contract Cwb-10238
Proj. SRI-3858

Descriptors: (*Meteorological satellites, Weather forecasting), (*Weather forecasting, Meteorological satellites), (*Clouds, Aerial photographs), Air mass analysis, Marine meteorology, Pacific Ocean.

Identifiers: TIROS.

The operational use of satellite cloud photographs is investigated through a series of TIROS I photographs taken on 21 orbits in the North Pacific from 18 through 24 May 1960. During this period, a sequence of vortices and fronts was observed in the Northern Pacific. Late in the period, blocking action developed in the East Central Pacific. The manner in which these circulation phenomena are reflected in the satellite photographs is discussed. Positioning of jet streams over the Northern Pacific in relation to the cloud systems is discussed and illustrated for each of the days in the case history. (Author)

AD-443 779 **Field 4B, 4A**
CFSTI Price: HC$2.60
Air Weather Service, Scott AFB, Ill.
WEATHER MODIFICATION,
by Herbert S. Appleman. 10 Jul 64, 24p
Technical rept. TR-177
N6-29 899

Descriptors: (*Artificial precipitation, Weather forecasting), (*Weather forecasting, Artificial precipitation), Clouds, Fog, Thunderstorms, Tropical cyclones.

Contents: The Formation of Clouds; The Formation of Precipitation; Weather Modification,--Increasing Precipitation, Cloud and Fog Dissipation, Modification of Thunderstorms, and Modification of Hurricanes; and Evaluating the Success of Weather-Modification Experiments. (Author)

AD-468 281 **Field 4B**
CFSTI Prices: HC$4.60 MF$0.50
Army Missile Command, Redstone Arsenal, Ala. Physical Sciences Lab.
COMPARISON OF UPPER-AIR CONDITIONS OVER WSMR, UTAH, AND GERMANY.
by Helmut P. Dudel. 30 Jun 65, 46p
Proj. DA-1X279191D678
AMC-RA-RR-TR-65-9

Descriptors: (*Climatology, High altitude), New Mexico, Utah, West Germany, Atmospheric temperature, Density, Wind, Periodic variations, Statistical data, Radiosondes, Guided missiles (Surface-to-surface), Meteorological parameters, Low altitude, Data, Tables.

Data are presented which show the differences between upper-air conditions over WSMR, Utah, Southern Germany, and northern Germany. Upperair parameters discussed are: mean temperature, mean density, density variability (one-sigma values), mean scalar wind speed, and most frequent wind direction. Two kinds of graphical presentations are used; vertical profiles for summer and winter in the altitude interval surface to 25 km above mean sea level, and curves of month-to-month variation for selected altotide levels. (Author)

AD-634 154 **Field 4B, 1B**
CFSTI Prices: HC$3.00 MF$0.75
Stanford Research Inst., Menlo Park, Calif.
TECHNIQUES FOR DETERMINING A WORLD-WIDE CLIMATOLOGY OF TURBULENCE THROUGH USE OF METEOROLOGICAL DATA.
Interim scientific rept.,
by R. M. Endlich, R. L. Mancuso, and J. W. Davies.4 May 66, 65p Scientific-1
Contract AF 19(628)-5173
Proj. AF-8624, SRI-5521
Task 862402
AFCRL-66-355

Descriptors: (*All-weather aviation, Clear air turbulence), (*Clear air turbulence, *Climatology), (*Jet streams (Meteorology), Climatology), Correlation techniques, Atmospheric motion, Micrometeorology, Moun-

tains, Meteorological parameters, Atmospheric sounding, Meteorological balloons, Civil aviation, Pilots.

This report consists of an introductory portion followed by separate sections concerned with aircraft observations of jet-stream and mountain-wave turbulence, statistical relationships between airline pilots' reports of turbulence and concurrent meteorological conditions, and the feasibility of measuring turbulence from rising balloons tracked by FPS-16 missile-tracking radar. The aircraft data show that turbulence correlates well with the horizontal wind direction shear measured on the mesoscale. Recent aircraft data also re-emphasize the hazards to aircraft that exist in mountain-wave turbulence. A pictorial model of the mountain wave is presented showing the usual turbulent layers and other prominent features. A number of meteorological quantities were correlated with frequencies of turbulence determined from pilot reports. The product of vertical vector wind shear and horizontal resultant deformation gave a correlation of 0.45--the highest value found so far from data of this type. Contingency tables of turbulence frequency as a function of vertical shear and lapse rate indicate that lapse rate is not significant in the manner indicated by Richardson's number. From meteorological data and empirical equations, expected frequencies of turbulence over the United States were computed and compared with observed frequencies. Reasonably good agreement was obtained, indicating that it is feasible to determine the climatology of turbulence from standard meteorological data. In the final section of the report, FPS-16 measurements of slant range, azimuth, and elevation of rising Jimsphere balloons are smoothed, and deviations from the smoothed curves are plotted as functions of time (or altitude). These plots reveal small self-induced oscillatory motions, as well as several layers of erratic motions that were apparently produced by random turbulent eddies. Data of this type are well suited to describing turbulence and associated wind characteristics from low levels into the stratosphere. (Author)

AD-634 305 **Field 4B**
CFSTI Prices: HC$4.00 MF$0.75
Chicago Univ., Ill. Dept. of the Geophysical Sciences.
MESOMETEOROLOGICAL STUDIES.
Final rept., 1 Feb 65-31 Jan 66,
by Roger A. Brown. Apr 66, 110p
Contract AF 19 (628)-4807, Grant Cwb-WBG-41
Proj. AF-8620
Task 862002
AFCRL-66-338
Grant Cwb-WBG-70.

Descriptors: (*Cumulonimbus clouds, *Atmospheric motion), (*Thunderstorms, Dynamics), Meteorological parameters, Air mass analysis, Photogrammetry, Mathematical models.

Identifiers: Mesometeorology project.

The report consists of three separate reports on mesometeorological studies. Two of the reports make use of data gathered over the Flagstaff mesometeorological network during the summers of 1960 and 1961. The growth rate of orographic cumulonimbi was determined by both surface and aerial photogrammetry. A set of equations were developed for computing eddy viscosity and diffusion coefficients within rotating and nonrotating convective currents. Energy computations were made for both cumuli and cumulonimbi. The third report summarizes the various explanations for the high pressure beneath thunderstorms and presents one more contribution to the controversy. (Author)

AD-634 360 **Field 4B, 14B**
CFSTI Prices: HC$1.00 MF$0.50
Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
HONEST JOHN MISSILE NO. 3906, ROUND NO. 5013 RBL (15 FEBRUARY 1966).
Meteorological data rept.
Jun 66, 14p DR-19
Task IV650212A127-02

Descriptors: (*Meteorological parameters, Sounding rockets), Tables, Meteorology, Wind.

Identifiers: Honest John.

Meteorological data gathered for the launching of Honest John, Missile Number 3906, Round Number 5013 RBL, are presented in tabular form. (Author)

AD-634 362 **Field 4B, 17I**
CFSTI Prices: HC$2.00 MF$0.50
Illinois State Water Survey, Urbana.
INVESTIGATION OF THE QUANTITATIVE DETERMINATION OF POINT AND AREAL PRECIPITATION BY RADAR ECHO MEASUREMENTS.
Interim rept. no. 3, 1 Oct 65-31 Mar 66,
by E. A. Mueller, and A. L. Sims. Jun 66, 30p
Contract DA-28-043-AMC-00032 (E)
Proj. DA-1V0-14501-B-53A-07
ECOM-00032-3
See also AD-626 325.

Descriptors: (*Meteorological radar, Rainfall), (*Rainfall, Radar scanning), Atmospheric precipitation, Particle size, Raindrops, Radar echo areas, Indonesia, Florida, Correlation techniques, Meteorology, Climatology.

The results of the drop size sample study indicate that volumes of about 50 cu m are necessary to estimate rainfall rate and radar reflectivity to 10 percent accuracy with 95 percent confidence. One-cubic-meter samples are sufficiently large that rainfall rate-radar reflectivity relationships can be reliably determined. The sample size variances contribute about 10 percent of the logarithmic scatter around the regression line. Analysis of drop size data from Indonesia yielded a reflectivity rate relationship similar to that from Miami, Florida data but with less scatter. Five-minute rainfall rate frequencies from Indonesia were also similar to those from Florida. (Author)

AD-634 381 **Field 4B, 22B**
CFSTI Prices: HC$5.00 MF$1.00
Inter-Range Instrumentation Group, White Sands Missile Range, N. Mex.
METEOROLOGICAL ROCKET NETWORK FIRINGS. SEPTEMBER 1965 FIRINGS.
Data rept.
Apr 66, 153p IRIG-109-62-Vol-49

Descriptors: (*Sounding rockets, *Atmospheric sounding), Tables, Telemetering data, Meteorological parameters, Weather communications, Meteorology, Climatology.

The Meteorological Rocket Network (MRN) combines the investigative efforts of a number of meteorological organizations engaged in upper atmospheric studies. Each report contains the wind and temperature measurements from all available Network firings for that particular month, along with computed values for pressure, density, and speed of 50includes the radiosonde observations nearest the time of firing. Release time of the radiosonde should be within plus or minus 6 hours of the time of firing. However, exceptions up to plus or minus 12 hours are made, particularly in tropical regions. Since only those firings which yield significant data are of interest here, the report does not include unsuccessful firings. Meteorological Rocket Network Stations which have contributed data are listed in the index. Any data delayed and thus omitted from previous publications will appear in a second addendum.

AD-634 391 **Field 4B, 6F**
CFSTI Prices: HC$2.00 MF$0.50
PACAF Epidemiological Lab., San Francisco, Calif. 96274. Epidemiological Flight (5th).
STUDIES OF THE ECOLOGY OF CLARK AB, CENTRAL LUZON, R.P. I. CLIMATOLOGY.
Technical rept.,
by Marshall Y. Kremers. 1966, 30p TR-16-65

Descriptors: (*Ecology, Philippines), (*Climatology, *Philippines), Meteorology, Environment, Diseases, Tropical regions, Terrain, Periodic variations, Tables, Meteorological parameters, Meteorological phenomena, Meteorological charts, Military facilities, Airports, Air Force.

An account is presented of the meteorological influences which determine the climate of the Philippine archipelago and this climate is described in general terms. A more precise and detailed description of the macroclimate of Clark Air Base, Luzon is given showing its tropical nature and characteristics as a starting point for ecological studies. (Author)

AD-634 650 **Field 4B**
CFSTI Prices: HC$1.00 MF$0.50
Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
STRATOSPHERIC TIDAL CIRCULATIONS,
by Willis L. Webb. Jun 66, 15p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Stratosphere, *Atmospheric tides), Solar radiation, Heating, Upper atmosphere, Diurnal variations, Climatology.

For abstract, see T 66 15.

AD-634 668 **Field 4B**
CFSTI Prices: HC$1.00 MF$0.50
Army Electronics Command, Fort Huachuca, Ariz. Research Div.
A MATHEMATICAL MODEL FOR AIR FLOW IN A VEGETATIVE CANOPY,
by Ronald M. Cionco. Jun 66, 15p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Micrometeorology, *Atmospheric motion), Terrain, Plants (Botany), Wind, Aerodynamics, Mathematical models.

The usual concept of surface roughness and zero plane displacement breaks down when one considers a vegetative canopy as the lower boundary for the planetary boundary layer. The roughness of many vegetative canopies derived from the log law changes with wind speed as do the zero-plane displacements. Ideally one would like to express the aerodynamic roughness of vegetation in terms of its height, density and drag characteristics. Restricting considerations to the turbulent transfer of momentum, a model was developed that will predict the canopy wind profile within semi-rigid canopies. For the purpose of this report, a canopy is defined as that layer spanning the region from the ground surface to the top of the plant. (Author)

AD-634 672 **Field 4B, 16B, 22B, 19D K**
CFSTI Prices: HC$1.00 MF$0.50
Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
REAL-TIME METEOROLOGICAL SYSTEM FOR SUPPORT OF UNGUIDED-ROCKET FIRINGS,
by Louis D. Duncan. Jun 66, 6p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Sounding rockets, *Impact prediction), (*Atmospheric sounding, Sounding rockets), (*Exterior ballistics, Sounding rockets), Meteorological parameters, Rocket trajectories, Real time, Data processing systems, New Mexico, Meteorology, Guided missile ranges.

Identifiers: Ballistic meteorology.

A real-time meteorological system to provide prelaunch impact prediction for unguided, high-altitude, multiple-stage rockets is discussed.

AD-634 695 **Field 4B, 16B, 19D**
CFSTI Prices: HC$1.00 MF$0.50
Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
LITTLE JOHN MISSILE NO. 2129, ROUND NO. 645 RM (25 APRIL 1966).
Meteorological data rept.
Jun 66, 20p DR-26
Proj. 1V650212A127-02

Descriptors: (*Meteorology, Guided missile ranges), (*Ballistics, Meteorology), (*Atmospheric sounding, Guided missile ranges), Meteorological parameters, Rocket trajectories, Impact prediction, Rocket research, Launching, Test facilities, New Mexico.

Identifiers: Little John, Ballistic meteorology.

Meteorological data gathered for the launching of Little John, Missile Number 2129, Round Number 645 RM, appear in tabular form. (Author)

AD-634 696 **Field 4B, 16B, 19D**
CFSTI Prices: HC$2.00 MF$0.50
Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
AEROBEE NASA 4.95 GS (20 May 1966).
Meteorological data rept.,
by Gordon L. Dunaway. Jun 66, 33p DR-34
Proj. DA-1V650212A127-02

Descriptors: (*Meteorology, Guided missile ranges), (*Ballistics, Meteorology), (*Atmospheric sounding, Guided missile ranges), Meteorological parameters, Rocket trajectories, Impact prediction, Rocket research, Launching, Test facilities, New Mexico.

Identifiers: Aerobee, Ballistic meteorology.

Meteorological data gathered for the launching of Aerobee NASA 4.95 GS are presented for the National Aeronautics and Space Administration and for ballistic studies. The data appear, along with calculated ballistic data, in tabular form. (Author)

AD-634 726 **Field 4B, 16B, 19D**
CFSTI Prices: HC$3.00 MF$0.75
Inter-Range Instrumentation Group, White Sands Missile Range, N. Mex.
FORT GREELY MISSILE RANGE REFERENCE ATMOSPHERE. PART I.
6 Oct 64, 88p IRIG-104-63-Pt-1-FG

Descriptors: (*Atmosphere models, Guided missile ranges), (*Meteorology, Guided missile ranges), (*Ballistics, Meteorology), (*Atmospheric sounding, Guided missile ranges), Meteorological parameters, Thermodynamics, Rocket research.

Identifiers: Ballistic meteorology.

The IRIG Range Reference Atmosphere, which is presented in this document, is one in a series to be published by the Inter-Range Instrumentation Group/Meteorological Working Group. Part I contains an explanation of the basic data, computational procedures, and the resulting values tabulated for altitude intervals between mean sea level and 30 km altitude. Monthly and annual thermodynamic values and wind quantities are tabulated. The thermodynamic quantities are height (gpm), pressure (kg f m/2), pressure (mb), temperature (K), virtual temperature (K), density (g m/3), speed of sound (m sec/1), relative humidity (%), and vapor pressure (mb) tabulated at 250 m intervals of geometric altitude. The wind quantities are scalar wind, zonal and meridional component values (m/sec) for eleven cumulative percentage frequency levels tabulated at 1 km intervals from 0 to 27 or 30 km altitude. A separate document for Part I will be issued for each of the several IRIG Range Reference Atmospheres. (Author)

AD-634 727 **Field 4B, 16B, 19D**
CFSTI Prices: HC$3.00 MF$0.75
Inter-Range Instrumentation Group, White Sands Missile Range, N. Mex.
FORT CHURCHILL MISSILE RANGE REFERENCE ATMOSPHERE FOR FORT CHURCHILL, CANADA. PART I.
7 Aug 64, 87p IRIG-104-63-Pt-1-FC

Descriptors: (*Atmosphere models, Guided missile ranges), (*Meteorology, Guided missile ranges), (*Ballistics, Meteorology), (*Atmospheric sounding, Guided missile ranges), Meteorological parameters, Thermodynamics, Rocket research, Canada.

Identifiers: Ballistic meteorology.

The IRIG Range Reference Atmosphere, which is presented in this document, is one in a series to be published by the Inter-Range Instrumentation Group/Meteorological Working Group. Part I contains an explanation of the basic data, computational procedures, and the resulting values tabulated for altitude intervals between mean sea level and 30 km altitude. Monthly and annual thermodynamic values and wind quantities are tabulated. The thermodynamic quantities are height (gpm), pressure (kg f m/2), pressure (mb), temperature (K), virtual temperature (K), density (g m/3), speed of sound (m sec/1), relative humidity (%), and vapor pressure (mb) tabulated at 250 m intervals of geometric altitude. The wind quantities are scalar wind, zonal and meridional component values (m/sec) for eleven cumulative percentage frequency levels tabulated at 1 km intervals from 0 to 27 or 30 km altitude. A separate document for Part I will be issued for each of the several IRIG Range Reference Atmospheres. (Author)

AD-634 752 **Field 4B, 16B, 19D**
CFSTI Prices: HC$2.00 MF$0.50
Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
AEROBEE NASA 4.92 (20 MAY 1966).
Meteorological data rept.,
by Gordon L. Dunaway. Jun 66, 31p DR-35
Task 1V650212A127-02

Descriptors: (*Meteorology, Guided missile ranges), (*Ballistics, Meteorology), (*Atmospheric sounding, Guided missile ranges), Meteorological parameters, Rocket trajectories, Impact prediction, Rocket research, Launching, Test facilities, New Mexico.

Identifiers: Aerobee, Ballistic meteorology.

Meteorological data gathered for the launching of Aerobee NASA 4.92 are presented for the National Aeronautics and Space Administration and for ballistic studies. The data appear, along with calculated ballistic data, in tabular form. (Author)

AD-634 757 **Field 4B, 16B, 19D**
CFSTI Prices: HC$3.00 MF$0.75
Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
ATHENA FLIGHT NUMBER 042 (27 MAY 1966) AND ATHENA FLIGHT NUMBER 043 (27 MAY 1966).
Meteorological data rept.,
by John M. Sharpe. Jun 66, 75p DR-39
Task DA-1V650212A127-02

Descriptors: (*Meteorology, Guided missile ranges), (*Ballistics, Meteorology), (*Atmospheric sounding, Guided missile ranges), Meteorological parameters, Rocket trajectories, Impact prediction, Rocket research, Launching, Test facilities, New Mexico.

Identifiers: Athena, Ballistic meteorology.

Meteorological data gathered for the launching of Athena Flight Number 042, Vehicle C-019 and Athena Flight Number 043, Vehicle D-031 are presented for the Air Force Ballistic Missile Reentry Systems Office and for ballistic studies. The data are presented in tabular form. (Author)

AD-634 760 **Field 4B, 16B, 19D**
CFSTI Prices: HC$2.00 MF$0.50
Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
LITTLE JOHN MISSILE NO. 2126, ROUND NO. 643 RM (14 APRIL 1966).
Meteorological data rept.
Jun 66, 31p DR-24
Proj. DA-1V650212A127-02

Descriptors: (*Meteorology, Guided missile ranges), (*Ballistics, Meteorology), (*Atmospheric sounding, Guided missile ranges), Meteorological parameters, Rocket trajectories, Impact prediction, Rocket research, Launching, Test facilities, New Mexico.

Identifiers: Little John, Ballistic meteorology.

Meteorological data gathered for the launching of Little John, Missile Number 2126, Round Number 643 RM, are presented in tabular form. (Author)

N66-14555 **Field 4B**
CFSTI Prices: HC$3.00 MF$0.75
Florida State Univ., Tallahassee. Dept. of Meteorology.
A STUDY OF NON-DEEPENING TROPICAL DISTURBANCE,
by M. Chaffee, M. Garstang, J. Levine, and J. M. Simpson. Aug 65, 61p
Grants NsG-481, Cwb-10693
NASA-CR-69099, AD-470 469
Prepared in cooperation with Dept. of the Army
Grant no. DA-AMC-28-043-64-G5.

Descriptors: *Cloud cover, *Flow field, *Rain, *Tropical storm, *Weather forecasting.

For abstract, see T 66 15.

N66-15246 **Field 4B**
CFSTI Prices: HC$3.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
THE INTERPRETATION OF TIROS RADIATION DATA FOR PRACTICAL USE IN SYNOPTIC WEATHER ANALYSIS,
by L. J. Allison, and G. Warnecke. 1964, 53p
NASA-TM-X-54966

Descriptors: *Radiation distribution, *Synoptic meteorology, *Tiros III Satellite, *Weather forecasting.

PB-169 465 **Field 4B**
CFSTI Prices: HC$3.00 MF$0.50
New York Univ., N. Y. Geophysical Sciences Lab.
A THEORY OF TURBULENT EDDIES,
by A. D. Kirwan Jr. Jan 66, 52p Technical rept.
TR-66-3
Grant NSF-GU-894

Descriptors: (*Atmospheric motion, Statistical analysis), Theory, Shear stresses, Reynolds number, Equations, Vector analysis.

Turbulent phenomena of inviscid fluids are treated from a rather novel point of view. The basic turbulence statistic is taken as a turbulent displacement

vector, the rms value of which might be regarded as an average eddy size. It is postulated that the displacement vector is related to the turbulent velocity through a second order tensor which is a function of the mean characteristics of the flow. This procedure has several advantages in studying shear induced turbulence. Firstly, it distinguishes between turbulence induced purely by the mean vorticity and that associated with mean deformation. Secondly, it leads to a concise geometrical interpretation of Reynolds stress. This in turn leads to a distinction between two types of turbulent kinetic energies: one associated with the mean deformation of turbulent eddies, and one associated with the mean vorticity as exemplified by the average rotation of the eddies. The approach taken here also leads quite naturally to two new sets of equations pertinent to turbulence. (Author)

PB-169 875 **Field 4B, 14B**
CFSTI Prices: HC$1.60 MF$0.50
Bollay (E), Associates, Inc., Boulder, Colo.
BOUNDARY LAYER PROFILE MEASUREMENT SYSTEM.
NCAR Technical notes,
by C. P. Edwards. Mar 66, 11p
NCAR-TN-16

Descriptors: (*Meteorological balloons, Boundary layer), (*Telemeter systems, Meteorological instruments), Magnetic recording systems, Measurement, Wind, Temperature, Humidity.

The report presents a brief survey of the capabilities of a new tethered-balloon system for making meteorological measurements of the boundary layer profile up to 5000 ft above the ground. The airfoil balloon is designed to maintain altitude in the face of winds at flight altitude.

AD-634 237 **See Field 19D**

AD-634 311 **See Field 17I**

AD-634 565 **See Field 2F**

AD-634 692 **See Field 13B**

AD-634 772 **See Field 12B**

BNWL-36 **See Field 7E**

5A. ADMINISTRATION AND MANAGEMENT

AD-457 925 **Field 5A, 15E**
CFSTI Price: HC$8.60
Analytic Services, Inc., Falls Church, Va.
DECISION NETWORKS.
Development planning memo.
Jan 65, 82p DPM-65-1
Contract AF 49(638)-1259

Descriptors: (*Decision making, Networks), (*Management planning, Decision making), Operations research, Reasoning, Military strategy, Cost effectiveness, Logistics, Management engineering, Air Force operations, Launch vehicles (Aerospace), Nuclear weapons, Weapon systems.

The purpose of this Development Planning Memo is to disseminate some early thoughts and conclusions on the applicability of network techniques to the analysis of decisions that must be made during the Air Force planning process. Two related briefings make up this Memo. The first of these is a short introductory briefing entitled 'Introduction--Decision Networks,' which states the reasons AFRDP and ANSER are interested in developing new techniques of analysis. The second, 'Decision Networks,' describes the theoretical basis for the formulation and use of decision networks and demonstrates, by an example, their planning applications. While work underlying this Memo was performed primarily by ANSER, AFRDP gave active assistance in bringing the work to its present state of development. (Author)

AD-634 148 **Field 5A, 9E, 9D, 20L K**
CFSTI Prices: HC$3.00 MF$0.75
Harvard Univ., Cambridge. Div. of Engineering and Applied Sciences.
SEMIANNUAL PROGRESS REPORT NO. 71.
Rept. for 1 Jul-1 Dec 65,
by J. A. Pierce, and R. W. P. King. May 66, 76p
Contracts Nonr-1866 (07), Nonr-1866 (16)
Contracts Nonr-1866 (32), Nonr-1866 (28), Research sponsored in part by ARPA, NSF and NASA. See also AD-629 484.

Descriptors: (*Solid state physics, Scientific research), (*Information theory, Scientific research), (*Control systems, Scientific research), (*Electromagnetic waves, Propagation), Very low frequency, Automatic, Operation research, Transistor amplifiers, Statistical analysis, Ferromagnetic materials, Ferroelectric materials, Microwave frequency, Antennas, Wave transmission, Plasmamedium.

Contents: Very low frequency propagation, electron and solid state physics, automation control, communications and networks, microwave application of ferromagnetic and ferroelectric materials, electromagnetic radiation. (Author)

AD-634 196 **Field 5A, 14A, 15E**
CFSTI Prices: HC$1.60 MF$0.50
RAND Corp., Santa Monica, Calif.
THE ROLE OF THE MILITARY COMPTROLLER IN DEFENSE MANAGEMENT,
by David Novick. 6 Jun 61, 11p P-2336
Prepared for presentation at the American Society of Military Comptrollers on June 1, 1961, Washington, D. C.

Descriptors: (*Cost effectiveness, Department of Defense), (*Management planning, Armed Forces budgets), (*Department of Defense, Management planning), Decision making, Management engineering, Operations research, Military personnel.

For abstract, see T 66 15.

AD-634 310 **Field 5A, 12B, 9B**
CFSTI Prices: HC$2.00 MF$0.50
Carnegie Inst. of Tech., Pittsburgh, Pa. Graduate School of Industrial Administration.
OPERATIONS RESEARCH IN THE DESIGN OF MANAGEMENT INFORMATION SYSTEMS.
Management science research rept.,
by Charles H. Kriebel. Apr 66, 28p MSRR-73
Contract Nonr-760 (24)
Proj. NR-047-048
Prepared for presentation at the Operations Research Symposium, Technical Association of the Pulp and Paper Industry, Philadelphia, Pa., 28-30-Mar 66.

Descriptors: (*Operations research, *Management engineering), (*Information theory, Management engineering), Data processing systems, Mathematical models, Design, Decision making.

Identifiers: Information systems.

The design of management information systems is concerned with the identification and detailed specification of the information and data processing resources required by an organization for decision-making and control. This paper surveys a representative selection of the literature on management information systems in which mathematical models are employed as the basis for analysis and systems design. Operations research provides a natural framework for the specification of management decision-making and control processes in information system designs. To realize the full economic potential of advanced data processing techniques in management information systems today, the close coordination of operations research and data systems activities has become a practical necessity for the modern business firm. (Author)

AD-634 331 **Field 5A, 9B, 5C**
CFSTI Prices: HC$1.60 MF$0.50
RAND Corp., Santa Monica, Calif.
POSSIBLE ECONOMIES THROUGH ELECTRONIC DATA PROCESSING,
by Edward F. R. Hearle. 9 Oct 61, 11p P-2452
Prepared for presentation to the Mayors' and Councilmen's program of the League of California Cities Annual Conference held in San Francisco, California, October 23, 1961.

Descriptors: (*Economics, *Data processing systems), Operations research, Management planning.

Identifiers: Local government.

Most of the glamour surrounding electronic data processing equipment in recent years has focused on the word 'electronic'. The basic quality of electronics that offers both excitement and economy in municipal data processing is speed. But speed in processing data is not even relevant until the data and their use in municipal operations are fully understood. A large part of the grief you have heard associated with using computers has arisen from this simple error -- people have often concentrated too soon and too much on the equipment, and too little and too late on the data systems which the equipment serves. The author discusses what municipal data processing consists of, and then suggests how electronic equipment can and should be used to provide the economies all municipal officials desire.

AD-634 333 **Field 5A, 9B**
CFSTI Prices: HC$1.60 MF$0.50
Rand Corp., Santa Monica, Calif.
THE FUTURE OF DATA PROCESSING IN STATE GOVERNMENT,
by Edward F. R. Hearle, and Raymond J. Mason.
8 Aug 60, 11p P-2062-RC
Prepared for publication in, State Government, a quarterly periodical of the Council of State Governments.

Descriptors: (*Data processing systems, *Management planning), Operation research, Information theory, Commerce.

Identifiers: State government.

For abstract, see T 66 15.

AD-634 389 **Field 5A, 14A**
CFSTI Prices: HC$4.00 MF$1.00
Office of Naval Research, Washington, D. C.
A STUDY OF METHODS WHICH COULD IMPROVE THE RELEVANCE OF NAVAL APPLIED RESEARCH AND EXPLORATORY DEVELOPMENT,
by Francis Howard Stoodley. 1 Jun 66, 140p
ONR-ACR-116

Descriptors: (*Naval research, *Research program administration), Cost effectiveness, Management engineering, Analysis, Costs, Decision making.

Identifiers: Research and development.

The document reports the results of an investigation of research investment decision-making within the Department of Defense. The uncertainties which characterize the R and D environment are examined and related to the specific process of investment in applied research and exploratory development. The Naval Applications Group, Office of Naval Research is studied with respect to the currently implemented procedures for the analysis of investment opportunity. The need for management improvement in the prediction of the relevancy of research output is identified and a conceptual model developed for conducting a rational investment analysis. This decision process is structured into two phases: (a) the formulation of in-

vestment objectives on the basis of operational relevancy, (b) the analysis of investment opportunities in relation to their technical attainability. Analytical techniques are proposed for interim relevancy improvement through the subjective integration of qualitative and quantitative decision variables. It is concluded that the innovative implementation of such techniques would provide both an immediate improvement in the relevancy of research output and a mechanism for further incremental improvement through the establishment of a historical data base of decision information. (Author)

AD-634 400 **Field 5A**
CFSTI Prices: HC$7.55 MF$2.00
American Ordnance Association, Washington, D. C. Engineering Documentation Section.
MINUTES OF ANNUAL MEETING (8th) HELD AT THE DAYTONA PLAZA HOTEL, DAYTONA BEACH, FLORIDA, APRIL 27 THROUGH APRIL 29, 1966.
Technical rept.,
by J. H. Jascheck. Jun 66, 456p

Descriptors: (*Symposia, *Ordnance), (*Management engineering, *Documentation), Reports, Data, Military requirements, Systems engineering.

For abstract, see T 66 15.

AD-634 615 **Field 5A, 14B**
CFSTI Prices: HC$8.25 MF$2.25
Office of the Chief of Research and Development (Army), Washington, D. C.
PROCEEDINGS OF THE 1966 ARMY SCIENCE CONFERENCE, UNITED STATES MILITARY ACADEMY, WEST POINT, N. Y., 14-17 JUNE 1966. VOLUME I.
Jun 66, 524p
Published in 3 vols. Vol. 2 available as AD-634 616. Vol. 3 is classified and available to qualified DDC users. All papers are also available individually. See AD-634 617- thru AD-634 693 for unclassified papers. See also AD-611 432, AD611 869, and AD-634 616.

Descriptors: (*Army research, *Symposia), Scientific research, Bibliographies.

Ninety-six papers were presented at the conference, while eight supplementary papers were accepted for publication in the proceedings and for substitution on the program, as needed. Volume I consists of unclassified papers whose principal authors are between the letters A through K.

AD-634 616 **Field 5A, 14B**
CFSTI Prices: HC$8.60 MF$2.50
Office of the Chief of Research and Development (Army), Washington, D. C.
PROCEEDINGS OF THE 1966 ARMY SCIENCE CONFERENCE, UNITED STATES MILITARY ACADEMY, WEST POINT, N. Y., 14-17 JUNE 1966. VOLUME II.
Jun 66, 560p
Published in 3 vols. Vol. 1 available as AD-634 615. Vol. 3 is classified and available to qualified DDC users. All papers are also available individually. See AD-634 617 thru AD-634 693 for unclassified papers.

Descriptors: (*Army research, *Symposia), Scientific research, Bibliographies.

Volume II consists of unclassified papers whose principal authors are between the letters L and Z.

N66-14417 **Field 5A**
CFSTI Prices: HC$1.00 MF$0.50
California Univ., Berkeley. Space Sciences Lab.
THE ROLE OF THE RESEARCH ADMINISTRATOR,
by C. W. Churchman, C. E. Kruytbosch, and P. Ratoosh. Oct 65, 16p Working Paper-38
Contract NSG-243-62
NASA-CR-68969

Descriptors: *Human performance, *Management.

For abstract, see T 66 15.

PB-169 850 **Field 5A, 9B, 13B**
CFSTI Prices: HC$3.00 MF$0.75
Massachusetts Inst. of Tech., Cambridge. School of Engineering.
A TECHNIQUE OF RESOURCE ALLOCATION FOR USE WITH THE CRITICAL PATH METHOD,
by James E. Burke Jr. Jun 65, 97p Research rept. R-65-20
Prepared in cooperation with Bureau of Public Roads, Washington, D. C. and the Commonwealth of Massachusetts Dept. of Public Works.

Descriptors: (*Scheduling, Management engineering), (*Management engineering, Scheduling), (*Programming (Computers), Scheduling), Costs, Civil engineering, Roads.

Identifiers: Critical path method.

The paper develops a set of program routines to perform project scheduling to meet the constraints of limited available resources. The system developed is designed for use as a supplement to scheduling by the Critical Path Method, and as such it is adapted for use in a management scheduling system which features Critical Path Scheduling. The computer programs developed provide the capability of determining whether a Critical Path schedule, as characterized by a specified time duration, can be adjusted to meet the constraints of limited resources. Provision is made for finding a schedule which is most economical with respect to fixed and variable project costs, and the costs of additional resources. The system's flexibility is demonstrated with the aid of example problems. Use of the system demands familiarity with the nature of a Critical Path Schedule, and the adherence to a simple set of user instructions in the preparation of input. (Author)

AD-634 200 **See Field 14A**

AD-634 258 **See Field 5I**

AD-634 325 **See Field 9B**

AD-634 371 **See Field 9B**

AD-634 448 **See Field 5C**

PB-169 659 **See Field 12B**

PB-170 255 **See Field 5C**

PB-170 312 **See Field 5C**

5B. DOCUMENTATION AND INFORMATION TECHNOLOGY

AD-413 620 **Field 5B**
CFSTI Price: HC$11.60
International Electric Corp., Paramus, N. J.
AN INVESTIGATION OF THE TECHNIQUES AND CONCEPTS OF INFORMATION RETRIEVAL.
Quarterly rept. no. 3, 1 Jan-31 Mar 63,
by Alfred Trachtenberg, Quentin A. Darmstadt, George Greenberg, and Alexander Szejman. 30 Apr 63, 115p Technical rept. no. P-AA-TR-0044
Contract DA-36-039-sc-90787
Rept. on Research in Information Retrieval.

Descriptors: (*Information retrieval, Analysis), Theory, Automation, Data storage systems.

All areas of capability were extended by analytical study of aspects of the information retrieval problem that required fuller definition and articulation. Input capabilities were specifically dealt with from the viewpoints of using word frequency as an indicator in automatic indexing and of using a non-Boolean retrieval scheme. Query capabilities were analyzed for the purposes of automatic extracting and redundancy control. Organization and search schemes were specified and their implications compared. A preliminary consideration of the relation of frequency to the assessment of indexing and thus to a model for system integration was presented. (Author)

AD-460 974 **Field 5B**
CFSTI Price: HC$4.60
Aerospace Corp., El Segundo, Calif. Applied Mechanics Div.
DATA STRUCTURING AND DEFINITIONS FOR COMPONENT PARTS INFORMATION RETRIEVAL,
by Martin Barbe. 1 Aug 64, 45p TOR-269(4307)-1
Contract AF 04 (695)-269

Descriptors: (*Information retrieval, Analysis), Documentation, Costs, Subject indexing, Dictionaries.

The report combines a general discussion of component parts data handling with specific suggestions on a data consolidation procedure in current use. The discussion is slanted towards the particular needs and problems of the Interservice Data Exchange Program (IDEP): designing a voluntary system to be contributed into and utilized by over 100 contractors. However, compatibility can still be maintained with the complex systems practical forc entrally staffed information banks. The report considers the utility and contents of the Parts Analysis Summary Sheet (PASS) now being used by NASA/MSFC, in conjunction with a series of work sheets, to normalize and compare a series of test reports on identical or related component parts. It proposes a version which combines the Work Sheet and the Summary Sheet information on a single card, thereby eliminating 90% of the present microfilming and printing cost. The report discusses the increasing degrees of rigidity possible in structuring the parts data found in the IDEP (Interservice Data Exchange Program) system, and comments on the degree considered appropriate to the probable stages of utilization. (Author)

AD-634 321 **Field 5B**
CFSTI Prices: HC$8.90 MF$2.50
Howard Research Co., Arlington, Va.
EDIS TASK I REPORT, WORK UNIT 1.2, CATEGORIZATION OF AVAILABLE DATA AND INFORMATION.
3 Jan 66, 592p
Contract DA-44-009-AMC-906 (T)
See also AD-634 322, AD-634 323, AD-634 324.

Descriptors: (*Army research, Documentation), (*Documentation, *Military engineering), Libraries, Data, Army, Technical information centers, Data storage systems, Department of Defense, Automation, Information retrieval.

Identifiers: EDIS, STINFO, Information systems.

The report is prepared for EDIS (Engineering Data Information System) Task I. The report includes : (1) a description of effort, including information required for the task, and the sources of information investigated, analyzed and listed for categorization: (2) definitions of terms used in the investigation and categorization of D and I (data and information) holdings: (3) listings of tables containing categorized information of all significant collections uncovered to data: and (4) information on the validation of available D and I from the data itself and from external sources. The information presented in the tabular listings includes: locations of available D and I: data on holding characteristics, such as physical form, volume and growth rates; sources and recipient/users of the D and I at each holding; selected services performed by the holding for the user; and subject matter specialties and disciplines of the D and I in each holding. (Author)

AD-634 322 **Field 5B**
CFSTI Prices: HC$4.00 MF$0.75
Howard Research Co., Arlington, Va.
EDIS TASK I REPORT, WORK UNIT 1.3, IDENTIFICATION OF USER NEEDS.
3 Jan 66, 125p
Contract DA-44-009-AMC-906 (T)

Descriptors: (*Army research, Documentation), (*Documentation, *Military engineering), Identification, Information retrieval.

Identifiers: Information systems, STINFO, EDIS, User surveys.

This report presents the identification of user needs in the Army RDT and E community. Two types of information are provided in this report. The first type includes discussion of the RDT and E cycle, the level of informational need, time response, item categories and other factors as they relate to the user of scientific and technical information. The second type of information presented is parametric and includes information on the users in the Army RDT and E community classified by discipline, subject field, mission/function and geographic distribution. This information was developed as part of the Task I effort for the Army Engineering Data and Information System (EDIS). (Author)

AD-634 323 **Field 5B**
CFSTI Prices: HC$4.00 MF$0.75
Howard Research Co., Arlington, Va.
EDIS TASK I REPORT, WORK UNIT 1.4: IDENTIFICATION OF DISCIPLINES AND FIELDS.
3 Jan 66, 125p
Contract DA-44-009-AMC-906 (T)
See also AD-634 321, AD-634 322, AD-634 324.

Descriptors: (*Documentation, *Military engineering), (*Army research, Documentation), Subject indexing, Classification, Information retrieval, Data, Technical information centers.

Identifiers: EDIS, Information systems, STINFO, Descriptors, Thesauri, Switching, Centers.

The report presents the identification and definitions of subject-oriented engineering and scientific disciplines and fields which are included in the EDIS Subject Categories. The discussion is extended to include the mix of subjects with other orientations, such as Item, Mission-Project, Expertise and Data Bank Categories. Sample queries are utilized to search the Subject and Item Categories. An EDIS categorization scheme, which is applicable to all categories, is derived. Potential application of the scheme to common data and information is discussed. The report also discusses the conversion of categories from a classification scheme to the EDIS Subject Categories. The final section discusses the advantages and limitations of forming field combinations. (Author)

AD-634 324 **Field 5B**
CFSTI Prices: HC$7.00 MF$1.75
Howard Research Co., Arlington, Va.
EDIS TASK I, WORK UNIT 1.9: CATEGORIZATION OF EXISTENT DATA SYSTEMS.
20 Jan 66, 365p
Contract DA-44-009-AMC-906 (T)
See also AD-634 321, AD-634 322, AD-634 323.

Descriptors: (*Documentation, *Military engineering), (*Army research, Documentation), Libraries, Data, Army, Technical information centers, Automation, Information retrieval, Subject indexing, Computers, Input-output devices, Punched cards, Data storage systems, Data processing systems.

Identifiers: EDIS, STINFO, Information systems.

Findings on individual data systems are presented under four groups: (1) systems that are currently being used by the Army; (2) systems used by the Army but operated by some other agency or organization; (3) systems which are being studied, planned, developed, or acquired by the Army; and (4) extant systems handling relevant data that could be but are not used by the Army at this time. The data gathered on these systems are discussed as relevant to forming an integral part of the data base upon which the over-all EDIS design concept will be built. Possible ramifications of these data on interfaces, security procedures, priority, controls, indexing, communication, and the switching center (s), are included. Discussions are supported graphically by categorizing existent Army systems by: disciplines and item categories; disciplines and fields; and geographical location. These systems are identified by the type of equipment each uses (manual, EAM, graphic devices, and EDP). A directory or organizations by field is also given. An analysis of the consistency and validity of gathered data is made. (Author)

AD-634 540 **Field 5B**
CFSTI Prices: HC$21.20 MF$1.25
Engleman and Co., Inc., Washington, D. C.
STUDY OF BUSHIPS LIBRARY CATALOG SYSTEMS AND THE INSTALLATION OF A KROSTERM SYSTEM FOR INFORMATION STORAGE AND RETRIEVAL.
Rept. for Nov 59-Mar 60,
by Harry J. Marx. Mar 60, 216p Rept. no. G-15-1
Contract NObs-78184

Descriptors: (*Libraries, Navy), (*Catalogs, Subject indexing), (*Information retrieval, Navy), Documentation, Reports.

Identifiers: Coordinate indexing, BuShips library, Kros-term system.

For abstract, see T 66 15.

AD-634 586 **Field 5B**
CFSTI Prices: HC$1.00 MF$0.50
System Development Corp., Santa Monica, Calif.
BIBLIOGRAPHY OF PROJECT LEVIATHAN DOCUMENTS.
Technical memo.,
by Virginia Parry Herold. 31 Mar 66, 12p TM-983/000/02
Supersedes TM-983/000/01 (AD-454 871).

Descriptors: (*Bibliographies, Documentation), Systems engineering, Programming (Computers), Information retrieval, Simulation.

Identifiers: Leviathan project.

Documents listed in this bibliography are subdivided into three content categories: (1) Theoretical and Technical Documents, (2) Design and Operation of the Leviathan System, and (3) Computer Programs and Equipment. Within each category, documents are arranged alphabetically by author and by date of publication. (Author)

N66-14577 **Field 5B**
CFSTI Prices: HC$1.00 MF$0.50
Alfred P. Sloan School of Management, Mass. Inst. of Tech., Cambridge.
TIME ALLOCATION AMONG THREE TECHNICAL INFORMATION CHANNELS BY R AND D ENGINEERS,
by T. J. Allen, and M. P. Andrien Jr. Aug 65, 23p
Rept. no. 131-65
Grants NsG 235-62, NSF GN-353
NASA-CR-69091

Descriptors: *Information, *Research project, *Operations research.

For abstract, see T 66 15.

PB-169 544 **Field 5B, 1B**
CFSTI Prices: HC$12.60 MF$0.75
Jonker Business Machines, Inc., Washington, D. C. Federal Systems Div.
INVESTIGATION INTO THE RETRIEVAL INDEXING AND SEARCHING SYSTEM.
Final rept.,
by Douglas E. Berninger, Rinah T. Korenman, and Paul V. Eiholzer. Sep 65, 123p
Contract FA-64-WA-5186

Descriptors: (*Aeronautics, Documentation), (*Information retrieval, Aeronautics), (*Subject indexing, Aeronautics), Search theory, Vocabulary, Reports, Effectiveness.

A study was made of the Federal Aviation Information Retrieval System (FAIRS), which serves diverse information needs of the Agency's technical and administration personnel. The FAIRS was developed to operational capacity by work on four major tasks: (1) Assigning descriptors and identifiers to reports to prepare them for subsequent retrieval. (2) Expanding, developing, and updating the system's vocabulary: the Thesaurus of FAA Descriptors. (3) Implementing the technical reports into the system. (4) Investigating the retrieval effectiveness of the system. (Author)

PB-169 558 **Field 5B, 6C**
CFSTI Prices: HC$1.60 MF$0.50
Biological Sciences Communication Project, George Washington Univ., Washington, D. C.
CITATION OF RUSSIAN LITERATURE IN 25 SELECTED U. S. BIOLOGICAL SCIENCES JOURNALS FOR THE YEARS 1959, 1960, AND 1961,
by Charles W. Shilling, and Paul C. Janaske Jul 62, 15p BSCP-5-62

Descriptors: (*Periodicals, Biology), (*Bibliographies, USSR), Frequency, Reports, Documentation.

The question has been raised concerning actual utilization by U. S. biologists of cover-to-cover translation of the following seven (7) Soviet journals being sponsored by the American Institute of Biological Sciences (AIBS). In order to shed light on this question of use, three U. S. biological science journals were picked to match, in terms of content, each of the seven Soviet journals, e.g. three U. S. Biochemistry journals to match the Doklady biochemistry section, etc. In addition, four general science journals were picked to make a total of 25 U. S. journals. Each scientific research or review article in the 25 U. S. journals was searched for all citations to the Soviet literature for the three years of 1959, 1960, and 1961. For purposes of comparison a record was made also of all citations to articles published in other foreign journals from all different countries. In addition, a record was made of all foreign work published as original articles in the 25 U. S. journals studied. The evidence developed by this study clearly indicates that the biologists do not make reference to the research work of the Soviet scientists.

PB-169 573 **Field 5B**
CFSTI Prices: HC$12.60 MF$0.75
Association of Special Libraries and Information Bureau, Cranfield (England).
FACTORS DETERMINING THE PERFORMANCE OF INDEXING SYSTEMS. VOLUME I. DESIGN. PART I. TEXT,
by Cyril Cleverdon, Jack Mills, and Michael Keen. 1966, 126p
NSF Scientific Documentation Project.

Descriptors: (*Subject indexing, Vocabulary), (*Vocabulary, Subject indexing), Effectiveness, Information retrieval, Great Britain, Documentation, Indexes, Language.

Identifiers: Descriptors.

Contents: General considerations, Test design, Documents and questions, Indexing procedures,

Formation of index languages, Testing techniques, Additional tests.

PB-169 574 **Field 5B**
CFSTI Prices: HC$25.70 MF$1.25
Association of Special Libraries and Information Bureau, Cranfield (England).
FACTORS DETERMINING THE PERFORMANCE OF INDEXING SYSTEMS. VOLUME I. DESIGN. PART 2. APPENDICES,
by Cyril Cleverdon, Jack Mills, and Michael Keen. 1966, 261p
NSF Scientific Documentation Project. See also PB-169 573.

Descriptors: (*Subject indexing, Vocabulary), (*Vocabulary, Subject indexing), Effectiveness, Information retrieval, Great Britain, Documentation, Indexes.

Identifiers: Descriptors.

Contents: First letter and enclosures sent to authors of research papers; Second letter and enclosures sent to authors of research papers; List of 1400 documents in the test collection; List of 279 questions used in test; Subsets of documents and questions; Authors of base documents and question compilers; Questions-Relevant documents sets; List of index terms; Single term dictionaries; Single term hierarchies; Simple concept hierarchies; Alphabetical index of concepts; Controlled terms vocabulary; Examples of various computer print-outs.

PB-169 686 **Field 5B**
CFSTI Prices: HC$1.00 MF$0.50
Federal Council for Science and Technology, Washington, D. C. Committee on Scientific and Technical Information.
PANEL 2 - INFORMATION SCIENCES TECHNOLOGY.
Rept. no 1 (Working paper).
Sep 65, 13p CP-2-65-R-1

Descriptors: (*Documentation, Operations research), (*Data processing systems, Theory), Technical information centers, Computers, United States Government, Job analysis, Effectiveness.

Attention was focused on those aspects of information sciences technology deemed of primary importance to the Federal Government. In this context, the major findings are: (1) The field of information sciences technology must be sufficiently structured to permit an identification of the organizational and human activities which it supports. (2) It is essential that improved experimentation with, and evaluation of, the agreed-upon products of information sciences technology be sponsored. (3) Certain selected policies should be invoked now as a result of known deficiencies in information sciences technology. (Author)

PB-169 698 **Field 5B**
CFSTI Prices: HC$1.60 MF$0.50
Western Reserve Univ., Cleveland, Ohio. Center for Documentation and Communication Research.
THE ANALYSIS OF MEDICAL DOCUMENTS WITH A COMPARATIVE EVALUATION OF THREE INDEXING PROCEDURES,
by William C. Buscher. Jul 63, 15p
Grant PHS-A-6399
NSF Scientific Documentation Project. Prepared for presentation at the Rochester Conference on Data Acquisition and Processing in Biology and Medicine, July 1963.

Descriptors: (*Medical research, Analysis), (*Subject indexing, Medical research), (*Indexes, Processing), Documentation, Data processing systems, Data storage systems, Information retrieval, Automatic indexing.

Identifiers: Evaluation.

The three procedures evaluated were selected as being more or less representative of three classes of analytical procedures: (1) The subject-heading index was selected from the first class: human analysis for human retrieval. (2) The Documentation Center's system of Telegraphic Abstracting was selected from the second class: human analysis for machine retrieval. (3) The permuted title index was selected from the third class: machine analysis for human retrieval.

PB-169 699 **Field 5B, 6E**
CFSTI Prices: HC$1.60 MF$0.50
Yale Univ., New Haven, Conn. Medical Library.
MODERATELY AND HEAVILY USED BIO-MEDICAL JOURNALS,
by Frederick G. Kilgour, and Thomas P. Fleming. 19 Apr 66, 15p
NSF Scientific Documentation Project. Prepared in cooperation with Columbia Medical Library, New York, N. Y.

Descriptors: (*Periodicals, Medicine), (*Indexes, Periodicals), Data storage systems, Computers, Information retrieval.

The major purpose of the investigation was to produce a list of current journal titles which might form a core collection of bio-medical journals. The findings of the study are based upon an analysis of usage of recent journal issues in the Columbia and Yale Medical Libraries. The investigation was carried out in anticipation of putting an index of articles from such journals into a computer to serve the medical libraries of Columbia, Harvard, and Yale, and possibly others.

PB-169 815 **Field 5B**
CFSTI Prices: HC$1.10 MF$0.50
Aktiebolaget Atomenergi, Stockholm (Sweden).
THE APPLICATION OF RANDOM SUPERIMPOSED CODING AND CHAIN SPELLING TO PEEK-A-BOO CARDS,
by W. Uhlmann. Mar 63, 8p
NSF Scientific documentation project.

Descriptors: (*Information retrieval, Indexes), (*Subject indexing, Analysis), Effectiveness.

Identifiers: Peek-a-boo cards, Coding (Documentation).

A procedure for applying random superimposed coding to Peek-A-Boo cards with the help of chain spelling and a randomizing square is presented. Some general aspects of the method are discussed. (Author)

PB-170 418 **Field 5B**
CFSTI Prices: HC$1.60 MF$0.50
Western Reserve Univ., Cleveland, Ohio. Center for Documentation and Communication Research.
SIMILARITY AND STABILITY OF TEXTUAL INTERESTS,
by Robert A. Fairthorne. 1961, 15p
Proceedings of a Conference on Information Retrieval p183-97 1963.

Descriptors: (*Information retrieval, Effectiveness), Stability, Subject indexing, Indexes, Documentation.

PB-170 419 **Field 5B, 9B, 9D**
CFSTI Prices: HC$1.10 MF$0.50
Royal Inst. of Tech., Stockholm (Sweden).
AUTOMATIC CORRECTION OF ERRORS IN TEXT,
by Lars Erik Thorelli. 1960, 8p
Pub. in Nordisk Tidskrift for Informations-Behandling v2 n1 p45-52 1962. NSF Scientific Documentation Project.

Descriptors: (*Errors, Corrections), (*Man-machine systems, Errors), (*Documentation, Corrections), Information theory, Computers, Typewriters, Sweden, Language, Data processing systems.

A vast amount of tedious labour is spent at detecting and correcting errors in text. Such errors are normal occurrence in text written by humans, but also often in text produced from a transmission system. The birth of the computers provides possibilities for leaving a large part of that labour to machines. To what extent this can be done is discussed in the paper and suitable methods are also suggested. The discussion is partly conducted in terms of information theory. (Author)

PB-170 421 **Field 5B, 6E**
CFSTI Prices: HC$1.10 MF$0.50
Western Reserve Univ., Cleveland, Ohio. Center for Documentation and Communication Research.
SEARCHING THE MEDICAL LITERATURE: HISTORY OF A PILOT PROJECT IN MECHANIZED INFORMATION RETRIEVAL,
by A. J. Goldwyn. 22 Jul 62, 8p
Methods of Information in Medicine-Methodik der Information in der Medizin v2 n2 p58-65 April 1963. NSF Scientific Documentation Proj.

Descriptors: (*Information retrieval, Medicine), (*Medicine, Information retrieval), Automatic, Coding, Computers.

Examples from many sources indicate the necessity for better communication of information between the medical researcher and the medical practitioner. Non-conventional methods of information retrieval offer a means of achieving this goal. An example is the experience of the Center for Documentation and Communication Research, Western Reserve University, in conducting a pilot study for the Communicable Disease Center. The subject was disease vector control literature and literature on vector-borne diseases, zoonoses and mycoses. A total of 2445 documents were analyzed by means of the telegraphic abstract, a structured and controlled 'deep' index. The terms of the abstract were encoded by means of the semantic code, a machine-searchable code which establishes and preserves a thesaural function in order to control the terminology. Encoded abstracts recorded on magnetic tape were searched, using the GE 225 computer, for answers to 77 questions. Previously identified documents were retrieved with an accuracy of 94.7%. Future tasks include continued study of the nature of the literature and its volume, and of present and potential users and of their needs. (Author)

PB-170 423 **Field 5B**
CFSTI Prices: HC$1.10 MF$0.50
Western Reserve Univ., Cleveland, Ohio.
PROBABILISTIC MODELS IN INFORMATION RETRIEVAL,
by William Goffman, Jacobus Verhoeff, and Jack Belzer. 1966, 6p
Proceedings of a Conference on Information Retrieval, Western Reserve Univ., p155-60 Apr 1962.

Descriptors: (*Information retrieval, Mathematical models), Set theory, Probability.

PB-170 424 **Field 5B, 6E, 6O**
CFSTI Prices: HC$1.10 MF$0.50
Institute for Advancement of Medical Communication, Bethesda, Md.
ABSTRACTING AND INDEXING IN THE MEDICAL SCIENCES,
by Isaac D. Welt. 18 Oct 61, 5p
Prepared for presentation at the International Seminar on Medical Documentation and Statistics, Oct 16-28, 1961, Berlin, Germany. Methods of Information in Medicine v1 n3 p100-4 Jul 1962. NSF Scientific Documentation Proj.

Descriptors: (*Abstracts, Medicine), (*Indexes, Medicine), (*Medicine, Information retrieval), Pharmacology, Processing, Subject indexing.

Abstracts and indexes constitute the most popular means of assuring adequate retrieval of the many thousands of papers published every year in the ever expanding field of medicine. Different types of abstracts and indexes are available for different purposes and to meet varying user requirements. The problem of 'keeping up' with developments in one's own field of endeavour can usually be solved by qualified abstractors. Most indexes serve the purpose of assuring the retrieval of pertinent documents. However, in order to retrieve specific pieces of information which are absolutely indispensible to the medical practitioner or scientist, a new approach is needed. This technique, which is termed the 'combined index-abstract' method, has been employed successfully for the handling of a large body of specific items of information in a restricted area of experimental and clinical pharmacology. (Author)

PB-170 436 **Field 5B**
CFSTI Prices: HC$3.60 MF$0.50
American Inst. of Physics, New York. Documentation Research Proj.
RESEARCH PROJECT FOR THE EVALUATION OF THE UDC AS THE INDEXING LANGUAGE FOR A MECHANIZED REFERENCE RETRIEVAL SYSTEM.
Progress rept., 1 Jul 65-31 Jan 66,
by Robert R. Freeman. 1 Feb 66, 40p AIP/DRP UDC-2
Grant NSF-GN-433
NSF Scientific Documentation Proj.

Descriptors: (*Classification, Effectiveness), (*Information retrieval, Automatic), Subject indexing, Data storage systems, Data processing systems, Punched tape.

Identifiers: Universal Decimal Classification.

The report reviews activities involving collection of English, French, and German schedules of the Universal Decimal Classification (UDC), translation of some schedules, further development of a mechanized (IBM 1401) UDC file maintenance system, experiments with automatic alphabetic indexing of UDC schedules, automatic typsetting and composition of UDC schedules, selection of equipment and rules for keyboarding the UDC into machine readable form, and initial steps toward collections of UDC-indexed documents and a retrieval system for test and evaluation purposes. Detailed appendixes deal with considerations of creating machine-readable UDC records on punched-paper tape for subsequent computer processing. (Author)

PB-170 437 **Field 5B, 2F**
CFSTI Prices: HC$1.10 MF$0.50
Pacific Southwest Forest and Range Experiment Station, Berkeley, Calif.
THE OXFORD SYSTEM: A STUDY OF ITS USES AT A FOREST EXPERIMENT STATION,
by Theodor B. Yerke, and Clyde M. Walker. 1963, 2p
Journal of Forestry v61 n4 p295-6 Apr 1963. NSF Scientific Documentation Proj.

Descriptors: (*Classification, Forestry), (*Forestry, Classification), Information retrieval, Indexes, Abstracts, Vocabulary, Catalogs.

Identifiers: Oxford system.

Forest Service interest in the Oxford System has never been backed by a thorough study of the classification in operation. To remedy this, a classified card catalog was constructed, using Commonwealth Forestry Bureau citations, as classified by the Forestry Abstracts staff (CTS cards). The objectives are (1) to discover what problems of information retrieval may develop, and (2) to evaluate the degree of bibliographic control offered by the Bureau's card service. A special index is necessary to 'Americanize' the system's terminology and to open up the classified catalog, with which U. S. researchers are unfamiliar. Work on the index includes consideration for future use as base of a mechanized system. (Author)

PB-170 439 **Field 5B**
CFSTI Prices: HC$1.10 MF$0.50
Massachusetts Inst. of Tech., Cambridge.
TECHNICAL INFORMATION, PLEASE,
by Myer M. Kessler. 1959, 3p
Pub. in The Technology Review v65 n5 p1-3 Mar 1963.

Descriptors: (*Information retrieval, Data processing systems), Automatic, Documentation, Computers, Management planning.

A pilot automatic information retrieval system was developed. Requirements of such a system are set forth.

PB-170 492 **Field 5B, 9B, 5G**
CFSTI Prices: HC$6.60 MF$0.75
Western Reserve Univ., Cleveland, Ohio. Center for Documentation and Communication Research.
AUTOMATIC PROCESSING OF METALLURGICAL ABSTRACTS FOR THE PURPOSE OF INFORMATION RETRIEVAL.
Progress rept. no. 1,
by Jessica S. Melton, George Putnam, William Foffman, and Celeste Hespen. 10 Jan 63, 69p
Grant NSF-G-24488
See also PB-165 972.

Descriptors: (*Abstracts, Processing), (*Metallurgy, Abstracts), (*Information retrieval, Abstracts), Automatic, Classification, Programming (Computers), Chemistry, Vocabulary, Subject indexing.

Identifiers: Sentences, Words, CHEMAB computer program.

The project aims at achieving fully automatic processing of previously generated conventional abstracts for information retrieval. The procedures call for taking the format of a printed text and automatically processing it to a machine-readable form on a level above straight dictionary lookup. This report discusses the rationale of the method for accomplishing this task and the progress made during the first six months of the project. Flexowriter tape is being used for input of text. Programs have been written for achieving format appropriate for further processing. The formation of 204 rules based on a classification of the vocabulary of 42 sentences, and the application of these rules 579 times to combine words into units meaningful for information retrieval are discussed. (Author)

PB-170 738 **Field 5B, 9B**
CFSTI Prices: HC$2.00 MF$0.50
Hawaii Inst. of Geophysics, Honolulu.
A COMPARISON OF SOME MACHINE-PRODUCED INDEXES.
Technical rept.,
by Wm. Mansfield Adams. Jan 65, 49p HIG-65-1
Grant NSF-GP-3473
Prepared in cooperation with Seismological Society of America, San Francisco; Grants NSF-N-1272, NSF-GN-95.

Descriptors: (*Indexes, Automation), Reports, Information retrieval, Subject indexing, Periodicals, Seismology, Computers, Automatic.

Identifiers: Keywords, KWIC index, Descriptors, Citation index, MEDLARS, Universal decimal classification.

Some machine-produced indexes are compared to assist in deciding on the format for a proposed index. The objectives of an index and the search procedure are analyzed. An explanation and a relationship is given for 'key-words-in-title' and 'key-references' of the same article. CONCLUSIONS: Based on the comparison of the indexes mentioned, a '53-Year Cumulative Index' was created for the 'Bulletin of the Seismological Society of America.' Typical pages are shown in a keyword and an author (or bibliography) index. An operational definition for relevance has been given in terms of the concepts in the posed question included in title of document. Use of a hypothetical title for searching a list of titles permits comparison of similar items for common characteristics. A proof is cited that relates the references to the concepts covered by an article. The relation of key references to keywords is then empirically estimated by ascertaining the key word-concept relationship.

RFP-516A **Field 5B**
CFSTI Prices: HC$2.00 MF$0.50
Rocky Flats Div., Dow Chemical Co., Golden, Colo.
UNCLASSIFIED PUBLICATIONS, 1965.
28 Mar 66, 22p
Contract AT (29-1)-1106

Descriptors: (*Reports, Classification), (*Documentation, Chemistry).

For abstract, see N 20 12.

TID-4577 **Field 5B, 9B**
CFSTI Prices: HC$1.00 MF$0.75
Division of Technical Information Extension (AEC), Oak Ridge, Tenn.
DESCRIPTIVE CATALOGING GUIDE,
Jan 66, 79p

Descriptors: (*Documentation, Instruction manuals), (*Programming (Computers), Documentation).

TID-85 (5th Rev.) **Field 5B**
CFSTI Prices: HC$4.00 MF$1.00
Division of Technical Information Extension (AEC), Oak Ridge, Tenn.
REPORT NUMBER SERIES USED BY THE DIVISION OF TECHNICAL INFORMATION IN CATALOGING REPORTS,
by Hannah B. Mayfield, and Helen W. White. Sep 65, 144p

Descriptors: (*Documentation, Reports), (*Reports, Identification).

For abstract, see N 20 13.

AD-634 149 See Field 13B

AD-634 371 See Field 9B

AD-634 526 See Field 9B

ANL-7060 See Field 6R

PB-169 410 See Field 14C

PB-169 696 See Field 5G

PB-169 697 See Field 9B

PB-170 420 See Field 5G

TID-22771 See Field 18I

TID-7015 See Field 7I

TID-7015 (Suppl. 8) See Field 7I

5C. ECONOMICS

AD-432 323 **Field 5C**
CFSTI Price: HC$3.00
RAND Corp., Santa Monica, Calif.
RAND CORPORATION PUBLICATIONS RELEVANT TO ECONOMIC DEVELOPMENT-A SELECTIVE BIBLIOGRAPHY,
by Frederick T. Moore, and Carolyn Spoeneman. Mar 64, 52p RM-4010

Descriptors: (*Economics, Bibliographies), Political science, Sociology.

The bibliography contains slightly over 400 items. (Author)

AD-634 199 **Field 5C, 12A**
CFSTI Prices: HC$2.60 MF$0.50
Rand Corp., Santa Monica, Calif.
PRODUCTION FUNCTIONS AND CAPITAL DEPRECIATION,
by Stephen Enke. 16 Feb 61, 23p P-2226

Descriptors: (*Industrial production, *Economics), (*Distribution functions, Industrial production), Distribution (Economics), Labor, Wages, Money, Industries, Optimization.

Production functions that determine the shares in output and income 'going' to labor, capital, or land, are basically output functions. Output is the dependent variable and stocks of 'capital,' and of certain other inputs, are the independent variables. This basic relationship--but not net income shares--is independent of the subsequent longevity of the factor inputs. Output isoquants can readily be reinterpreted as constant gross value added curves if the value of the 'throughput' is constant. Accountants and economists can subsequently distinguish net and gross value added isoquants. But output is output and physical. Determination of the most economical capital-to-labor combination requires that the gross cost of these factors, including the cost of capital stock depreciation, be considered. If only net interest and wages are taken to be the cost of capital and labor respectively, these costs must be related to a net value added function, otherwise the supposed 'optimum' will involve too much capital relative to labor. (Author)

AD-634 236 **Field 5C, 13H**
CFSTI Prices: HC$6.00 MF$1.50
George Washington Univ., Washington, D. C. Logistics Research Project.
AN APPRAISAL OF INPUT-OUTPUT ANALYSIS BASED ON A DOCUMENTATION OF THE INTERINDUSTRY RELATIONS STUDY FOR 1947.
Scientific rept.,
by William R. Bailey. 6 Jun 66, 282p Serial no. T-185
Contracts Nonr-761 (03), Nonr-761 (05)
Projs. NR-345-107, NR-047-001
Supported in part by Contract Nonr-761 (06), Proj. NR-347-008.

Descriptors: (*Industrial relations, *United States Government), Economics, Model theory.

The 1947 input-output program of the Federal Government is thoroughly documented, and the estimates derived from the various models developed during the program are published for the first time. The quality of the estimates is analyzed in terms of the structure and the empirical content of the models, and this analysis is integrated with other important analyses of the input-output method. Finally, it is shown that the effectiveness of a general model of national income formation can be enhanced by incorporation with an input-output model. (Author)

AD-634 353 **Field 5C, 22A**
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
ECONOMIC IMPACT OF SPACE EXPENDITURES,
by S. M. Barro. Jun 66, 16p P-3386

Descriptors: (*Economics, *Astronautics), Costs, United States Government, Production, Employment, Labor, Distribution (Economics), Money, Government procurement, Space flight.

The discussion deals with the fiscal effects of space spending. At least three different categories of potential benefits are examined: (1) Direct economic outputs from space operations. The primary examples to date have been communication, weather, and navigation satellites. There have not been any equivalent applications of manned space vehicles. (2) Technological 'spillover.' This term has been used to refer to fairly direct transfers to civilian technology of products, materials, and processes developed for the space program. The aggregate economic significance of spillovers thus far identified has not been very impressive. (3) General contributions to science and technology. This category comprises all of the economic benefits that might, in principle, be traced to the space program's augmentation of the nation's total R and D effort. It provides the broadest possibilities for claims about economic benefits from space, but of course, the most limited possibilities for rigorous measurement and verification.

AD-634 376 **Field 5C, 5D, 8F**
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
PROBLEMS IN EVALUATING LATIN AMERICAN DEVELOPMENT,
by Leland L. Johnson. Jun 66, 25p P-3388

Descriptors: (*Economics, *Latin America), Political science, Labor, Money, Distribution (Economics), Commerce, Wages, Industries, Industrial production, Agriculture, Government (Foreign), Statistical analysis.

Three major aspects of the article, Reflections on Latin American Development, by Professor Keith B. Briffen, are discussed: (1) Sources of past growth particularly with respect to the role of foreign investment; (2) the distribution of income as a reflection of class conflict; and (3) alternative possibilities for reform.

AD-634 448 **Field 5C, 5A**
CFSTI Prices: HC$1.00 MF$0.50
Western Management Science Inst., Univ. of California, Los Angeles.
ECONOMIC PLANNING AND THE COST OF THINKING,
by Jacob Marschak. May 66, 18p WMSI Working Paper-100
Contract Nonr-233 (75)
Proj. NR-047-041

Descriptors: (*Economics, *Management planning), (*Decision making, Costs), Optimization, Data, Personnel management, Information theory.

The organizational economics of planning is concerned with the question: how to use given resources to obtain and process information in order to determine and carry out optimal strategies. The 'coarsening' or, more generally, 'garbling' of information never adds to its 'gross value'. Therefore, division of tasks among decision makers (between decentralized branches, or between commander and subordinate, for example) would carry no advantage it it were not for the cost (not necessarily additive, and possibly infinite) of making decisions and communications by a given 'brain'. If we regard market economy, centralized economy, or any intermediate social forms as several methods of processing information into decisions and compare their abilities to reach a 'Pareto optimum' the respective organizational costs must be taken into account. (Author)

AD-634 698 **Field 5C, 12A**
CFSTI Prices: HC$3.00 MF$0.50
RAND Corp., Santa Monica, Calif.
PURE COMPETITION, COALITIONAL POWER AND FAIR DIVISION,
by Lloyd S. Shapley, and Martin Shubik. Jun 66, 57p RM-4917-PR
Contract AF 49 (638)-1700
See also AD-429 720.

Descriptors: (*Economics, *Game theory), Mathematical models, Mathematical logic, Money, Set theory.

Identifiers: Cores (Game theory), Value theory, Competition.

Consideration of a new application of the mathematical theory of games to the conceptual foundations of the theory of economic competition. The Memorandum first gives a nontechnical discussion of three different types of solution to mathematical models of the marketplace, namely, the competitive equilibrium, the core, and the value, and relates them to three principles of distribution, namely, pure competition, coalitional power, and fair division. Several models are then analyzed in detail. First, numerical solutions are calculated for a class of symmetric market games, chosen to contrast the value with the other two solutions. Next, as the number of traders is increased, the convergence of all three solutions to a single outcome is proved for a general class of markets with money. Finally, an illustrative market model without money is evaluated explicitly as a function of the size of the market. This represents the first substantial application of a new definition of the value for games without side payments. The formal definitions are summarized in an appendix. (Author)

AD-634 737 **Field 5C, 15E**
CFSTI Prices: HC$2.00 MF$0.50
Naval Supply Research and Development Facility, Bayonne, N. J.
A FORECAST OF ADVANCES IN THE APPAREL MANUFACTURING INDUSTRIES OVER THE NEXT FIVE YEARS.
Rept. for 1 Jun 65-31 Mar 66,
by Morton L. Silverstein. Mar 66, 33p
Proj. T-F015-01-13-001-00-1
Prepared in cooperation with Fashion Inst. of Tech., New York, N. Y.

Descriptors: (*Clothing, *Industries), (*Textile industry, Economics), Automation, Textiles, Data processing systems, Quality control, Distribution, Standards.

Identifiers: Prediction.

A general technological survey and short range forecast of probable garment fabrication techniques and apparel industry operations was undertaken. The investigation revealed that over the next five years significant improvements in the productivity and in the management functions of the industry will develop. It appears that the impact of these developments will result in more rapid and more mechanized output of the same type of clothing generally available today, rather than in completely new types of apparel. (Author)

PB-170 052 **Field 5C, 8F, 5I**
CFSTI Prices: HC$1.00 MF$0.50
Community Planning Services, Inc., Monroeville, Pa.
A CONSERVATION EDUCATION AREA, PRINCE GALLITZIN STATE PARK, CAMBRIA COUNTY, PENNSYLVANIA.
1965, 16p
Prepared in cooperation with Area Redevelopment Administration, Washington, D. C. See also PB-170 522.

Descriptors: (*Economics, Pennsylvania), (*Pennsylvania, Economics), (*Natural resources, Economics), Recreation, Housing, Education, Animals, Forestry, Water supplies, Fish, Employment.

Identifiers: Area redevelopment, Motels, Recreation facilities, Tourist industry, Conservation.

A 1500-acre tract in Prince Gallitzin State Park has been set aside as a Conservation Education Area to be known as NATUREALM. Here at one spot, and within a few hours, man can learn about present and past uses and abuses of soils, waters, forests and wildlife. At the same time, he can receive a basic introduction to the more impor-

tant accomplishments and problems in resource management. Four state agencies--the Department of Forests and Waters, the Soil Conservation Commission, the Game Commission and the Fish Commission--will offer this knowledge to student and adult alike through carefully planned exhibits and on-the-ground demonstrations. These will be arranged and prepared to illustrate the interrelationships of the various resources--how wildlife may adversely affect the growth of forests; how good soil practices on farmland will produce larger crops of rabbits and bobwhite quail; how soil erosion and siltation can destroy fish in streams; and how proper forestry methods can provide better hunting and fishing. NATUREALM will provide an opportunity for the student to become acquainted with the natural world in which he lives. It will give the interested adult a chance to see what his State conservation agencies are doing without the expense and time of traveling all over the Commonwealth.

PB-170 217 **Field 5C, 8F**
CFSTI Prices: HC$4.00 MF$0.75
Stevens and Wilkinson, Atlanta, Ga.
FEASIBILITY STUDY. NATURAL BRIDGE, TENNESSEE.
Final rept.,
by H. B. Masters. 1961. 108p
Contract Cc-5976

Descriptors: (*Economics, Tennessee), (*Tennessee, Economics), (*Recreation, Economics), Feasibility studies, Natural resources, Forestry, Employment, Labor, Industries, Roads, Traffic.

Identifiers: Area redevelopment, Recreation facilities, Fish and wildlife, Tourist industry.

The site has certain limitations, such as its remoteness and limited scenic drawing power. There is an abundance of forest land in this general area that can be used for hunting. The site also has excellent stream conditions for fishing. This area can be characterized as one with a relatively low rate of use, with no first class accommodations, and with extremely limited piecemeal programming compared to its potential. Recommendations: (1) the Natural Bridge site be purchased from its present owner, (2) approximately 500 acres of adjoining property be purchased, and (3) efforts be made to set in motion zoning and planning procedures according to the county governmental structure. (4) Serious consideration be given to construction and development of small neighborhood residential areas for sale. The price range should be from $6,000 to $10,000. (5) The County of Wayne seek a loan at the lowest possible rate of interest to implement the Natural Bridge project.

PB-170 219 **Field 5C, 8F**
CFSTI Prices: HC$4.00 MF$1.00
Utah Univ., Salt Lake City. Bureau of Economic and Business Research.
A TOURIST AND RECREATION FEASIBILITY STUDY OF THE UNITAH-OURAY INDIAN RESERVATION,
by Roger H. Nelson. May 65. 146p
Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Economics, Utah), (*Utah, Economics), (*Recreation, Economics), Commerce, Industries, Feasibility studies, Employment, Traffic, Costs.

Identifiers: Area redevelopment, Tourist industry, Indian reservations, Indians, Motels, Recreation facilities.

Conclusions: The economic outlook for the candidate businesses under study appeared marginal or negative in each instance. Nevertheless, the economic inventory of the study area yielded some promising data. Summer tourist traffic: The area has a large number of passing tourists each year. The yearly average daily total traffic count on Highway US-40 east of Roosevelt showed a 1962 tally of 2,600 vehicles. Of these , 1,850 were passenger cars--1,170, Utah and 680, foreign. Significance of nearby tourist attractions: An additional and important advantage of the area is its strategic location in relation to Dinosaur National Monument, Flaming Gorge, and the Vernal Field House of Natural History. Seasonal and location factors: Since the analyses of the standard types of individual businesses or arterial nucleated conformations did not turn out to be positive, it is believed that any successful endeavor would have to be strictly of a 'spectator tourist type,' rather than service-oriented. This is due primarily to the spatial disadvantage of the site--that is, its nearness to two other service areas, Vernal and Roosevelt. There are other factors of the site which limit the type of tourist endeavor that could be considered. The rural location would certainly prevent constructing a 'Disneyland' or 'Legend City' type of park, because of the high initial costs.

PB-170 221 **Field 5C, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Program Research, New York.
FOUR-TOWN REDEVELOPMENT AREA IN SOUTHWESTERN CONNECTICUT COMPOSED OF THE TOWNS OF ANSONIA, DERBY, OXFORD,AND SEYMOUR,
by Richardson Wood. Jul 62. 91p
Prepared in cooperation with Area Redevelopment Administration, Wahsington, D. C.

Descriptors: (*Economics, Connecticut), (*Connecticut, Economics), (*Employment, Connecticut), Industries, Brass, Copper, Site selection, Recreation, Floods, Water pollution, Roads, Industrial research, Automation.

Identifiers: Area redevelopment, Tourist industry, Recreation facilities, Industrial parks.

Present outlook for employment: There is little question but what employment growth in the area will continue. Employment potential: Manufacturing: (1) Derby and Ansonia between them have only three or four sites that contain more than ten acres apiece, and those in the valley would be expensive to develop. Seymour is somewhat better off. Oxford has a number of good and large sites. Nothing has yet been done about any of these sites. (2) At least seven manufacturers in the area need sites for growth either immediately or within the next two years. (3) Provision of sites alone should bring about enough employment to take up all possible slack in the labor market within a period of two or three years. Tourism, Recreation, and Residence: The Housatonic Valley between Derby and New Milford is rapidly being developed with facilities for summer tourists, with summer bungalows, and with year around homes. Research. One requirement for an industrial research center is nearness to a first-class university with scientific schools. Another requirement is an attractive choice of residential communities. The Gateway Region can provide both of these.

PB-170 222 **Field 5C, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Sno-Engineering, Inc., Franconia, N. H.
THE SKIER MARKET IN NORTHEAST NORTH AMERICA.
Land Water Recreation rept. no. 6,
by Selden J. Hannah, and Theodore A. Farwell, Jr. Nov 64. 58p
Prepared for New Hampshire State Planning Proj., Contract N. H. P-15 (G). See also PB-169 750.

Descriptors: (*Economics, North America), (*Recreation, Economics), (*Mountains, Recreation), (*North america, Recreation), Geography, Commerce, Skis, New Hampshire.

Identifiers: Skiing, Tourist industry, Area redevelopment, Recreation facilities.

Of the 1962-63 skier market, 13.2% or some 59,000 skiers failed to participate during 1963-64. 90.2% of these skiers are only temporarily 'dropouts.' The major reasons given for non-participation were: (a) new family responsibilities; (b) employment demands; (c) sickness and/or injury; (d) military obligation. Growth in the numbers of active skiers in Northeast North America over the past 11 years is estimated at 15.4% annually. This estimate of net growth is based upon the finding that a large majority (0 (90.2%) of the 1962-63 skier market 'dropouts' are only of a temporary nature, and that this finding can be applied to prior years' markets. The 1962-63 skier market skied an average of 15.5 days during 1963-64, a drop of 2.2 days from reported mean participation of 17.7 days in 1962-63.

PB-170 227 **Field 5C, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Bureau of Outdoor Recreation, Washington, D. C.
TOURIST AND RECREATION POTENTIAL: EASTERN PANHANDLE AREA, W. VA. (GRANTE, HARDY, HAMSPHIRE, MINERAL AND MORGAN COUNTIES),
by James N. Lowe, David Brown, Henry W. Dill Jr, Ross Floyd, and Benjamin, F. Holmes. May 64. 88p
Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Economics, West Virginia), (*West Virginia, Economics), (*Recreation, West Virginia), Industries, Natural resources, Roads, Water supplies, Mountains.

Identifiers: Area redevelopment, Tourist industry, Reservoirs, Fish and Wildlife, Tourist industry, Recreation facilities.

The outlook for furture growth of the tourism-recreation industry in the Eastern Pandhandle study area is vary promising. In its favor are such strong local recreation assets and resources as (1) proximity to many of the primary urban population centers of the Middle Atlantic States; (2) availability of water suitable for recreation use, including existing and potential reservoir sites; (3) excellent fish and wildlife resources, especially trout and whitetail deer; (4) availability of public land for potential recreation development; (5) an improved transportation network, particularly interstate highways connecting the area with major tourist market areas; (6) the high scenic qualities of the area; and (7) the rich historical background of the area. (Author)

PB-170 230 **Field 5C, 8F**
CFSTI Prices: HC$4.00 MF$0.75
Bureau of Outdoor Recreation, Washington, D. C.
TOURIST AND RECREATION POTENTIAL: IDAHO 'PANHANDLE' AREA,
by James N. Lowe, David Brown, Henry W. Dill Jr, and Dale Q. Haskins. Nov 63. 102p
Prepared in cooperation with Area Redevelopment Administration, Washington, D. C. Availability: Original document in color until exhausted.

Descriptors: (*Economics, Idaho), (*Idaho, Economics), (*Recreation, Idaho), Mountains, Lakes, Rivers, Industries, Natural resources.

Identifiers: Area redevelopment, Recreation facilities, Fish and wildlife, Tourist industry.

The area comprises the five northernmost countries in Idaho -- Benewah, Bonner, Boundary, Kootenai, and Shoshone -- and is commonly referred to as the Idaho 'Panhandle'. It is largely an area of mountains, forests, lakes, and streams. Its 7,662 square miles are sparsely populated. Coeur d'Alene, on Lake Coeur d'Alene and the County Seat of Kootenai County, is the largest community with a 1960 population of 14,291. Other principal communities include Kellogg (pop. 5,061), Sandpoint (pop. 4,355), Wallace (pop. 2,412), St. Maries (pop. 2,435), Priest River (pop. 1,749), and Bonners Ferry (pop. 1,921). Chief economic activities are lumbering, mining tourism-recreation,

and agriculture. The Panhandle area has a number of strong recreation assets ranging from scenic mountain areas to large natural lakes that can be exploited to take advantage of these increasing national demands for outdoor recreation. The Panhandle area is favored with an abundance of water resources which, if properly developed, could give rise to a well balanced regional tourist and recreation complex.

PB-170 231 **Field 5C, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Bureau of Outdoor Recreation, Washington, D. C.
TOURIST AND RECREATION POTENTIAL: SOUTHERN MARYLAND (CALVERT, CHARLES AND ST. MARY'S COUNTIES,
by James N. Lowe, David Brown, Neil J. Stout, and William H. Honore. Jan 65, 88p
Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Economics, Maryland), (*Maryland, Economics), (*Recreation, Maryland), Industries, Natural resources, Road, Beaches, Culicidae, Aquatic animals, Plants (Botany).

Identifiers: Area redevelopment, Recreation facilities, Fish and wildlife, Motels, Tourist industry.

The current tourism and recreation industry in Southern Maryland is relatively underdeveloped in relation to its recreation resource potential. Salt water fishing and boating dominate present outdoor recreation facilities in the area. Public recreation areas and facilities are extremely limited, both in number and scope. Quality-type overnight accommodations and restaurants for the tourist and general traveling public are highly concentrated along U. S. Highway 301, with slot machines serving as a major feature. Vacation resort facilities are found only in a few select sites along some of the principal waterways. (Author)

PB-170 232 **Field 5C, 8F**
CFSTI Prices: HC$4.00 MF$0.75
Bureau of Outdoor Recreation, Washington, D. C.
TOURIST AND RECREATION POTENTIAL: THE JUNIATA MOUNTAINS AREA SOUTH CENTRAL PENNSYLVANIA (BEDFORD, BLAIR, CENTRE, FULTON, HUNTINGDON, JUNIATA, MIFFLIN AND PERRY COUNTIES),
by David Brown, Henry W. Dill Jr, Ross Floyd, and Ray Schenck. Nov 64, 110p
Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Economics, Pennsylvania), (*Pennsylvania, Economics), (*Recreation, Pennsylvania), Roads, Mountains, Dams, Natural resources.

Identifiers: Area redevelopment, Recreation facilities, Reservoirs, Motels, Skiing, Tourist industry, Fish and wildlife.

Recreation development in the Juniata area generally is oriented to heavy summer day-use activities. For the most part, these activities are concentrated in the area's existing State parks and State forests, with exceptionally heavy use in these and other areas offering water-based recreation opportunities. The Raystwon Dam reservoir area in Huntingdon County has the only significant concentration of private recreation developments in the area. However, these consist almost entirely of individual summer home sites. To the outsider, the area is perhaps best known for the quality of its fishing and hunting, especially deer hunting. Sightseeing, particularly during the fall foliage season, also attracts many outsiders. Within the past two years, skiing on Blue Knob Mountain in Bedford County, and in the vicinity of State College in Centre County, has become an additional prime generator of outside interest and visitation. The area has few suitable commercial facilities to accommodate the incoming tourist and recreation seeker, particularly the vacationer, and to provide him and his family with a variety of things to see and do.

PB-170 233 **Field 5C, 8F**
CFSTI Prices: HC$4.00 MF$0.75
Bureau of Outdoor Recreation, Washinton, D. C.
TOURIST AND RECREATION POTENTIAL: LAFAYETTE AND SUWANNE COUNTIES, SUWANNE RIVER AREA, FLORIDA,
by James N. Lowe, David Brown, Henry W. Dill Jr, Ross Floyd, and Rolland B. Handley. Mar 64, 91p
Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Economics, Florida), (*Florida, Economics), (*Recreation, Florida), Rivers, Swamps, Industries, Natural resources, Georgia.

Identifiers: Area redevelopment, Fish and wildlife, Tourist industry, Recreation facilities.

The Suwannee River, made famous by Stephen Foster's well-known song, originates in the Okefonokee Swamp in southern Georgia and flows generally southwesterly across north-central Florida to the Gulf of Mexico. The Florida portion of the Suwannee Basin spreads over a 12-county area. It is predominately rural in character with sparse population and extremely high dependence on agriculture and forestry as a means of livelihood. The Suwannee River Area possesses a number of resources and other assets that, if properly developed or exploited, could be used to attract vacation travelers and insure the area's participation in the Nation's and Florida's rapidly growing tourist and recreation industry. Foremost of these are (1) the popular image of the Suwannee River gained through Stephen Foster's songs; (2) the excellent location of the area athwart many of the main transportation routes to and from south Florida; (3) the scenic attractions of the Suwannee River and nearby natural springs and the opportunities these present for water and related recreation developments; and (4) the varied fish and wildlife resources of the area.

PB-170 234 **Field 5C, 8F**
CFSTI Prices: HC$4.00 MF$1.00
Bureau of Outdoor Recreation, Washington, D. C.
TOURIST AND RECREATION POTENTIAL: LAKE CHAMPLAIN-ADIRONDACK AREA (ESSEX AND CLINTON COUNTIES, NEW YORK AND GRAND ISLE COUNTY, VERMONT),
by James N. Lowe, David Brown, Henry W. Dill Jr, Ross Floyd, and Alfred W. Buck. Sep 64, 132p

Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Economics, New York), (*New York, Economics), (*Vermont, Economics), (*Recreation, Economics), Industries, Lakes, Roads, Water pollution, Beaches, Harbors.

Identifiers: Area redevelopment, Tourist industry, Recreation facilities, Por.

Before the resources and other assets of the Adirondack-Lake Champlain study area can be fully realized, a number of basic adjustments must first be made. These include (1) dedication of key tracts of land for public recreation purposes; (2) implementation of comprehensive planning and zoning; (3) continued effort on pollution abatement; (4) construction and improvement of access roads; (5) expansion of public beaches; (6) expansion and reorientation of commercial accommodations; (7) expansion and improvement of safe harbors and other boating facilities in Lake Champlain; (8) expansion of camping and picnicking facilities; (9) creation of a central Port of Entry for foreign pleasure craft at Rouses Point; (10) lengthening the tourist season through such means as development of winter sports activities; (11) initiation of a areawide information program; and (12) more effective promotion of Lake Champlain and other assets of the area. (Author)

PB-170 235 **Field 5C, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Bureau of Outdoor Recreation, Washington, D. C.
TOURIST AND RECREATION POTENTIAL: MONROE COUNTY, OHIO,
by James N. Lowe, David Brown, Henry W. Dill Jr, Ross Floyd, and Robert L. Black. Jan 64, 64p
Prepared in cooperation with area redevelopment Administration, Washington, D. C.

Descriptors: (*Economics, Ohio), (*Recreation, Economics), (*Ohio, Economics), Industries, Costs, Dams, Lakes, Natural resources.

Identifiers: Area redevelopment, Fish and wildlife, Tourist industry, Motels, Reservoirs, Recreation facilities Marina.

It is recommended that the Monroe Lake recreation area be expanded to include modern campground and picnic facilities; A first-class commercial motel with restaurant, conference and club rooms be constructed in the vicinity of Woodsfield; a dam be constructed on Sunfish Creek north of Woodsfield; a recreation complex be developed around the proposed reservoir on Sunfish Creek; a series of small overflow dams on Sunfish Creek, between the proposed dam site and Cameron, be constructed to create large pools of water for fishing, swimming, boating, and other recreation uses; a marina and recreation facility be developed along the Ohio River to more effectively exploit the excellent potential of the River for the development of water-oriented recreation facilities and activities; a series of overflow dams be constructed at suitable sites in the Little Muskingum River to stabilize the water level and create pools of water to improve the fishing qualities of the stream; game management and public hunting areas be established in the central and northeastern sections of Monroe County. (Author)

PB-170 237 **Field 5C, 8F**
CFSTI Prices: HC$1.00 MF$0.50
Newman Associates, Ridgewood, N. J.
EVALUATION OF A REPORT ON A FOUR-TOWN REDEVELOPMENT AREA IN SOUTHWESTERN CONNECTICUT COMPOSED OF THE TOWNS OF ANSONIA, DERBY, OXFORD, AND SEYMOUR,
by Philip C. Newman. Oct 62, 23p
Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Economics, Connecticut), (*Connecticut, Economics), Employment, Lakes, Sewage, Water supplies, Recreation, Industries, Automation, Electronic equipment, Brass.

Identifiers: Area redevelopment, Industrial parks.

Naugatuck Valley is suffering from abnormal unemployment for the following reasons: (a) Loss of markets and resultant decline in the brass industry the principal employer in the area; (b) poor management in some factories; (c) lack of easily developed sites because low lands are subject to flood and are already occupied; (d) movement of mills out of the area to take advantage of incentives offered by Southern States and Rhode Island. The unemployment situation will not grow worse from now on because of economic recovery by the remaining brass mills. The report thinks that the manufacture of components for automation systems offers the greatest prospect for the region. The area could also be a good location for research laboratories, especially in fields stressing mechanical ingenuity and skill. It is estimated that in the next five years, existing local industry will add 500

to 900 new jobs and in the next ten years 2000 new jobs will be added. There may be employment potential in the newely enlarged lake Zoar, north of Derby, on the Housatonic River. Actually, there is a chain of three lakes near large urgbn population that have not been exploited for water tourism to date. (Author)

PB-170 238
Prices: HC$3.00 MF$0.75
Bureau of Outdoor Recreation, Washington, D. C.
TOURIST AND RECREATION POTENTIAL: PINE RIDGE INDIAN RESERVATION AREA, SOUTH DAKOTA (BENNETTI, SHANNON, AND WASHABAUGH COUNTIES, INCLUDING THE NON-MONUMENT SECTION OF THE BAD-LANDS - AERIAL GUNNERY RANGE),
by James N. Loew, David Brown, Robert R. Wagner, Clarence W. Bullach, and William Drake.
Dec 64, 86p
Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Economics, South Dakota), (*South Dakota, Economics), (*Recreation, Economics), Industries, Roads, Dams, Lakes, Natural resources, Commerce, Employment.

Identifiers: Area redevelopment, Tourist industry indians, Indian reservations, Shopping centers, Fish and wildlife, Recreation facilities, Arts and crafts.

Based on the pertinent findings on the overall tourist-recreation potential of the Pine Ridge Indian Reservation area, it is recommended that (1) the Oglala Sioux Tribal Council take necessary action to approve and expedite the exchange of tribally owned Badlands for other public lands with the view of expanding the Badlands National Monument area under the supervision of the National Park Service; (2) The Oglala Sioux Tribal Council, in cooperation with the Bureau of Indian Affairs, develop an expanded tourist-recreation development program for the reservation area; (3) The tribal leaders, in cooperation with the Bureau of Indian Affairs' personnel, conduct a grassroots education campaign to acquaint tribal members, Bureau of Indian Affairs' employees, and other residents of the area, with the responsibilities and benefits to be derived from a well-conceived and operated tourist-recreation program; (4) a feasibility study for the location of a first-class commercial quality motel at Pine Ridge be conducted as soon as possible; (5) Consideration should be given to the establishment of buffalo and antelope ranges in cooperation with the National Park Service.

PB-170 240 **Field 5C, 8F**
CFSTI Prices: HC$5.00 MF$1.00
Bureau of Outdoor Recreation, Washington, D. C.
TOURIST AND RECREATION POTENTIAL: SOUTHERN AND EASTERN SOUTH CAROLINA (26 COUNTIES),
by James N. Lowe, David Brown, Henry W. Dill Jr, and Rolland B. Handley. Mar 65, 176p
Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Economics, South Carolina), (*South Carolina, Economics), (*Recreation, Economics), Industries, Lakes, Piers, Roads, Beaches, Commerce, Natural resources.

Identifiers: Area redevelopment, Marina, Highways, Tourist industry, Motels, Recreation facilities.

The South Carolina area covered includes 26 of the State's 46 counties. The area includes all of the coastal plain area or 'Low Country' part of the State except for Florence, Marion, and Dillon Counties. Three 'Up Country' counties in the Piedmont are also included. These are Chester and Lancaster Counties on the north end, and McCormick County on the western edge of the area. The report summarizes the present status of tourism-recreation development; indicates present and prospective tourist markets; identifies major adjustments needed to achieve the tourism-recreation growth potentials; suggests locations which appear to offer good development possibilities, and recommends actions necessary if potentials are to be achieved. (Author)

PB-170 246 **Field 5C, 8F**
CFSTI Prices: HC$2.00 MF$0.50
Checchi and Co., Washington, D. C.
APRE-FEASIBILITY STUDY OF POSSIBLE PROJECT FOR RIVER VIEW ESTATES, INC., CALHOUN COUNTY, ILLINOIS.
Jan 65, 41p
Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Economics, Illinois), (*Illinois, Economics), (*Recreation, Illinois), Dams, Harbors, Industries.

Identifiers: Area redevelopment, Marina, Tourist industry, Recreation facilities.

The outlook is not good for the successful development of tourism and recreation projects on the property in the immediate or short-run future. (This does not include the sale of some individual lots along the riverfront which might well be feasible.) The outlook for such tourism and recreation projects over a much longer period of time is good. The factors which limit the prospects for an attractive return on investment in the early phases of operation are the high initial development costs for possible projects; the relative inaccessibility of the area; the existence of competing facilities closer to the St. Louis market; and the fact that commerical tourism is not yet an established industry in the region. The factors which enhance the long-term prospects for developing the property are the potential of Navigation Pool 25 as an attraction to boating enthusiasts; the isolated, unspoiled and the non-commercial character of the area; River View's extensive and scenic river frontage on Pool 25; and the rising demand in the St. Louis market for the kind of facilities which might be developed on the property. The most promising project to start with on River View Estates would be a small-boat harbor and marina. In the shortrun, this facility would probably not pay off by itself. However, it would focus attention on River View and would be a strong attraction for resident vacationists. These would come primarily from the St. Louis area. Furthermore, it would significantly increase the value of the entire property for real estate development.

PB-170 249 **Field 5C, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Plasman (Stephen K.) and Associates, Inc. Minneapolis, Minn.
SHOPPING FACILITY FEASIBILITY STUDY: PINE RIDGE, SOUTH DAKOTA,
by Stephen K. Plasman. Oct 64, 66p
Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Economics, South Dakota), (*South Dakota, Economics), (*Commerce, South Dakota), Site selection, Employment, Traffic, Transportation, Population, Roads.

Identifiers: Area redevelopment, Shopping centers.

Present Pine Ridge shopping facilities are inadequate and for some items non-existent. The addition of new shopping facilities will change present shopping habits because of their availability and convenience. The present income level of residents in the trade area results in a larger proportion of family income being spent for food and other convenience goods than is the case in more prosperous areas. The demand exists for additional shopping facilities in Pine Ridge. A facility of about 11,000 square feet is recommended including space for supermarket and bakery, drug store, women's and men's clothing, appliance, department store items, hardware items, shoes, and other goods and services all under one roof. The predicted sales volume of the new shopping facilities is in addition to that obtained by existing competitive facilities in Pine Ridge and White Clay. While shopping facilities in Pine Ridge and White Clay will be affected to some extent, more distant towns and cities will be affected to a greater extent. Construction employment requirements are estimated at 20 to 30 men over a four to five month period. (Author)

PB-170 251 **Field 5C, 8F**
CFSTI Prices: HC$4.00 MF$0.75
Candeub, Cabot and Associates, Scranton, Pa.
DEVELOPMENT PLAN FOR MAUCH CHUNK CREEK WATERSHED AREA, CARBON COUNTY, PA.
Aug 64, 120p
Availability: Original document in color until exhausted. Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Economics, Pennsylvania), (*Pennsylvania, Economics), (*Recreation, Pennsylvania), Dams, Industries, Natural resources, Employment, Costs.

Identifiers: Area redevelopment, Reservoirs, Tourist industry, Skiing, Recreation facilities.

Through the efforts of the Carbon County Soil Conservation District, the Carbon County Commissioners and the members of governing bodies of Jim Thorpe, Summit Hill, Lansford and Lehighton, a watershed plan for multiple-use reservoir is being developed. It is contemplated that this project will result in a 324 acre reservoir to be developed for multi-purpose use including flood control, fish and wildlife propagation, municipal water supply, boating, swimming and other feasible recreation, resort and tourist facilities. The primary purpose of this study is to explore the feasibility of developing a recreation facility complex in the Mauch Chunk Creek Watershed Area and to determine the type and extent to which recreation facilities should be developed to capture a share of the regional market for recreation activities.

PB-170 254 **Field 5C, 8F**
CFSTI Prices: HC$2.00 MF$0.50
First Research Corp., Miami, Fla.
OVERALL ECONOMIC DEVELOPMENT PROGRAM EAST LAKE CUMBERLAND PROGRAM EVALUATION AND RECOMMENDATIONS FOR ACTION.
Oct 62, 38p
Contract Cc-5920

Descriptors: (*Economics, Kentucky), (*Kentucky, Economics), (*Industries, Kentucky), Wood, Agriculture, Mineral products, Recreation, Rural areas, Housing, Population, Employment, Natural resources, Processing, Cool, Pipes, Transportation, Commerce.

Identifiers: Area redevelopment, Tourist industry.

Contents: East Lake Cumberland OEDP area: Review and Field survey. Recommendations for action. (1) Forest based industries: (a) Wood harvesting, processing and handling industries; (b) Finished wood products. (2) Agribusiness. (3) Mineral-associated industries: (a) Coal pipelining industry; (b) Other mineral-associated industries. (4) Community development as an impetus to industry. (5) Tourism.

PB-170 255 **Field 5C, 5A, 8F**
CFSTI Prices: HC$2.00 MF$0.50
First Research Corp., Miami, Fla.
ORGANIZATIONAL AND PROCEDURAL OUTLINE FOR OVERALL ECONOMIC DEVELOPMENT PROGRAM AREAS.
Oct 62, 50p
Contract Cc-5920

Descriptors: (*Economics, Kentucky), (*Kentucky, Economics), (*Management planning, Economics), Reports, Urban planning, Commerce, Rural areas, Industries, Symposia.

Identifiers: Area redevelopment.

This report incorporates two major components. One is devoted to the presentation of a functional outline for use in constructing comprehensive OEDP reports. The second component is concerned with the presentation of an organizational framework which may be used in establishing local economic development councils. In developing the outline, every requirement essential to the construction of the comprehensive report has been set forth. In addition, the requirements have been designed to aid the local councils in analyzing their respective areas in terms of: environmental characteristics, resource assets, economic activity, and potential for economic development. Then, to augment the outline, a check-list of questions pertaining to the area has been included that should be answered in detail. As the outline is followed and as the questions are answered, the steps that are necessary to the restoration of economic vigor should become readily apparent. Since a basic precept of the Area Redevelopment Authority, in establishing the OEDP areas, is the utilization of local residents as members of the individual councils, the organizational framework is developed accordingly. The organizational chart presented in this report, along with descriptive text, is quite detailed. However, the degree of detail adopted and made operative by the local area councils should be governed by the needs of the area and by the number of qualified people available to serve in the various administrative capacities and in the required committees. (Author)

PB-170 256 **Field 5C, 8F**
CFSTI Prices: HC$2.00 MF$0.50
First Research Corp., Miami, Fla.
OVERALL ECONOMIC DEVELOPMENT PROGRAM NORTHEASTERN KENTUCKY COUNTIES PROGRAM EVALUATION AND RECOMMENDATIONS FOR ACTION.
Oct 62, 42p
Contract Cc-5920

Descriptors: (*Economics, Kentucky), (*Kentucky, Economics), (*Industries, Kentucky), Wood, Agriculture, Minerals, Recreation, Rural areas, Housing, Natural resources, Population, Labor, Coal, Mineral products, Pipes, Transportation, Commerce Forestry.

Identifiers: Area redevelopment, Tourist industry.

Contents: Northeastern Kentucky OEDP; Review and Field Survey. Recommendations for action: (1) Forest based industries: (a) Wood Harvesting processing, and handling industries; (b) Finished wood products; (2) Agribusiness; (3) Other projects, (4) Mineral-associated industries: (a) Coal pipelining industries; (b) Other mineral-associated industries. (5) Community development as an impetus to industry; (6) Tourism.

PB-170 257 **Field 5C, 8F**
CFSTI Prices: HC$2.00 MF$0.50
First Research Corp., Miami, Fla.
OVERALL ECONOMICDEVELOPMENT PROGRAM: UPPER KENTUCKY RIVER VALLEY: PROGRAM EVALUATION AND RECOMMENDATIONS FOR ACTION.
Oct 62, 36p
Contract Cc-5920

Descriptors: (*Economics, Kentucky), (*Kentucky, Economics), (*Industries, Kentucky), Forestry, Water supplies, Paper industry, Housing, Coal, Recreation, Employment, Natural resources, Training, Roads.

Identifiers: Area redevelopment, Wood industry, Tourist industry, Recreation facilities.

Action projects are recommended for (1) foreat-based industries (pulp and paper mills; wood harvesting, processing, and handling industries; wood products, including prefabricated and retirement housing; (2) pipelining coal; (3) community development; and (4) tourism.

PB-170 258 **Field 5C, 8F**
CFSTI Prices: HC$5.00 MF$1.00
Baker (Michael, Jr.), Inc., Rochester, Pa.
MASTER PLAN FOR RECREATIONAL-TOURISM DEVELOPMENT OF MIDDLE ISLAND CREEK TYLER COUNTY, WEST VIRGINIA,
by Arthur C. Miller. 3 Sep 65, 145p
Contract C115-65

Descriptors: (*Economics, West Virginia), (*West Virginia, Recreation), (*Recreation, West Virginia), Commerce, Costs, Management planning, Feasibility studies, Housing, Natural resources, Roads, Traffic, Employment.

Identifiers: Area redevelopment, Recreation facilities, Tourist industry.

The Jug area and the adjacent County Home for the Aged property along Middle Island Creek are highly suitable for development as a recreational-tourism complex. The estimated cost of renovating the County Home for the Aged and accessory barn into a motel and restaurant is $447,000, or some $129,000 less than the estimated cost of $576,000 required for new construction to accommodate the same number of guests. The project will complement, rather than compete with, other recreational facilities in the vicinity of Tyler County and will attract annual visitations of 412,000 tourists by 1970 and 704,000 tourists by 1980. Development of the project will generate 103 full-time and 30 part-time jobs during the initial phase of operation, rising to 276 full-time and 101 part-time jobs after development is complete; it will generate $4.7 millions of 'new money' annually in Tyler County by 1970 and $9.7 millions by 1980. The project is expected to earn an annual net profit before debt retirement of $97,000 by 1970, rising to $780,000 by 1980.

PB-170 259 **Field 5C, 8F**
CFSTI Prices: HC$4.00 MF$1.00
Bureau of Outdoor Recreation, Washington, D. C.
TOURIST AND RECREATION POTENTIAL WESTERN NORTH CAROLINE (ALLEGHANY, ASHE, AVERY, CHEROKEE, CLAY, GRAHAM, MACON, MADISON, MITCHELL, SWAIN, WATAUGA, AND YANCEY COUNTIES),
by David Brown, Henry W. Dill Jr, Ross Floyd, Benjamin F. Holmes, and Rolland B. Handley. Jul 64, 139p
Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Economics, North Carolina), (*North Carolina, Recreation), (*Recreation, North Carolina), Commerce, Identification, Natural resources, Rural areas, Roads, Employment, Mountains, Forestry, Lakes.

Identifiers: Area redevelopment, Recreation facilities, Tourist industry, Indian reservations, Fish and wildlife.

This report is the result of a brief field reconnaissance of the tourist and recreation potential of a 12-county area in western North Carolina. It was undertaken to point up possibilities with promise for expanding tourism-recreation in the area as one of the means of creating greater local employment and income opportunities. As such, the findings and recommendations are not intended to be definitive or final in terms of the feasibility, economic or otherwise, of specific development projects, locations or opportunities, but rather suggestive as to the kind and general location of recreation areas and facilities which offer the best possibilities for development in the area. The report describes and locates the study area; summarizes the present status of tourism-recreation development; indicates present and prospective tourist markets; identifies major adjustments needed to achieve the tourism-recreation growth potentials; and suggests a number of locations which appear to offer good development possibilities.

PB-170 260 **Field 5C, 2B, 8F**
CFSTI Prices: HC$4.00 MF$0.75
First Research Corp., Miami, Fla.
REGION I -- AGRICULTURE: ECONOMIC ANALYSIS OF A SELECTED AREA IN EASTERN KENTUCKY.
Aug 62, 104p
Contract Cc-5920

Descriptors: (*Economics, Kentucky), (*Kentucky, Economics), (*Industries, Kentucky), (*Agriculture, Kentucky), Population, Housing, Forestry, Rural areas, Natural resources, Employment, Minerals, Recreation, Transportation, Roads, Commerce, Training, Urban planning, Coal, Mining engineering, Wood.

Identifiers: Area redevelopment, Tourist industry.

Contents of report -- Characteristics of Region I. Economic structure, recent trends and potentials. Recommendations for implementing overall economic development: (a) industrial development; (b) transportation; (c) tourism development; (d) national forest development; (e) community facilities; (f) land reclamation; (g) housing development; (h) occupational training and retraining.

PB-170 261 **Field 5C, 8F**
CFSTI Prices: HC$2.00 MF$0.50
Kaufmann (Arthur C.) and Associates, Inc., Philadelphia, Pa.
DETERMINATION OF FEASIBILITY OF PROPOSED RHODE ISLAND OCEANARIUM.
1 Sep 65, 46p
Contract EDA-C-7-66 (Neg.)

Descriptors: (*Economics, Rhode Island), (*Rhode Island, Economics), (*Recreation, Rhode Island), Feasibility studies, Oceans, Museums, Employment, Aquatic anaimals, Industries.

Identifiers: Area redevelopment, Recreation facilities, Tourist industry.

Rhode Island Oceanarium: Inc., a Corporation organized for profit, proposes to build and operate an Oceanarium on the West (mainland) side of Narragansett Bay near Saunderstown, Rhode Island. The proposed Oceanarium would consist of a circular, two-story, modern building fronting on Narragansett Bay and embodying a 25-tank aquarium, administrative offices, souvenir counters, library, seminar rooms, auditorium, indoor and outdoor pools and a Museum-of-the-Sea area. The conclusions, following the feasibility study are that (1) the proposed venture cannot be profitable, (2) the location selected is not sensible from most standpoints, (3) the estimates of the additional employment expected are much too high, (4) the design of the proposed building is attractive and appears to be adequate, (5) too much dependence is placed upon local sea life in the display of animals.

PB-170 268 **Field 5C, 8F**
CFSTI Prices: HC$2.00 MF$0.50
Northwest Consultant Oceanographers, Inc., Seattle, Wash.
POTENTIAL CONTRIBUTION OF THE MARINE ENVIRONMENT TO ECONOMIC REDEVELOPMENT OF THE NORTH COAST COUNTIES OF CALIFORNIA,
by James A. Crutchfield, and F. Ward Paine.
1965, 32p
Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Economics, California), (*California, Economics), (*Fishes, California), Industries, Recreation, Bays, Washington (State), Oregon, Beaches.

Identifiers: Area redevelopment, Recreation facilities, Food industry.

RECOMMENDATIONS: (1) The Eureka or Creascent City areas be considered as sites for processing plants for such fish as hake, following initiation of commercial operations under the control of California, Oregon, and Washington. (2) Humboldt or Del Norte County be suggested to the Bureau of Commercial Fisheries as location for a pilot plant for the development of fish protein concentrates. (3) Every phase of the bottomfish industry be improved and modernized. (4) Atltention be given development of efficient brakish water rearing ponds for salmon that would be fertilized by processed waste. (5) Chinook and Silver salmon runs be re-established by restoration of spawning areas and replanting of clear rivers entering Humboldt Bay. (6) Salmon feeding areas be promoted for sport fishing. (7) Better beach access and jetty or pier facilities be developed, particularly in Humboldt County. (8) Land acquisition at all levels of government be continued for development of water-based recreation.

PB-170 270 **Field 5C, 13B, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Maguire (Charles A.) and Associates, Engineers, Providence, R. I.
FEASIBILITY STUDY OF AN INDUSTRIAL PARK DEVELOPMENT PROJECT IN WOONSOCKET, RHODE ISLAND.
Sep 65, 68p
Contract C-190-65 (Neg)

Descriptors: (*Economics, Rhode Island), (*Rhode Island, Industries), (*Urban planning, Industries), (*Industries, Site selection), Industrial plants, Civil engineering, Engineering geology, Feasibility studies, Terrain, Power supplies, Water supplies, Costs, Sanitary engineering, Roads.

Identifiers: Area redevelopment, Industrial parks.

The report includes aerial photography and the preparation of photogrammetric maps at a scale of 1 in = 40 feet and related surveys; subsurface investigations, sketch plans of park layouts, preliminary cost estimates, investigation of sales price of comparable industrial land, and feasibility of the site with regard to adequacy of highways, utilities and topographic features.

PB-170 273 **Field 5C, 2F, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Greenacres, Inc., Seattle, Wash.
FOREST INVENTORY: ISLETA PUEBLO FOREST LANDS, NEW MEXICO.
Rept. for 29 Jun 64-29 Apr 65,
by K. E. Beil. 26 Feb 65, 78p
Contract Cc-6173

Descriptors: (*Economics, New Mexico), (*New Mexico, Economics), (*Forestry, New Mexico), Trees, Infections.

Identifiers: Area redevelopment, Indian reservations.

Conclusions: The total commercial forested area of 7,929 acres was sampled by 398 1/5-acre plots resulting in a total gross volume of 21,551,000 board feet Scribner scale at statistical accuracy of :4.72% for trees 12" Dbh and larger. The total gross cubic foot volume for trees 6-10" Dbh is 897,467. Of the total board foot volume, mistletoe infection is as follows: No infection, 86.1%; Light infection, 9.2%; Heavy infection, 4.7%. It is apparent a substantial volume of timber can and should be harvested from these timbered areas. The data listed will provide the basis for harvesting and other forest management plans. (Author)

PB-170 274 **Field 5C, 2F, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Greenacres, Inc., Seattle, Wash.
FOREST INVENTORY: JEMEZ PUEBLO FOREST LANDS NEW MEXICO,
Rept. for 29 Jun 64-29 Apr 65,
by K. E. Beil. 26 Feb 65, 85p
Contract Cc-6173

Descriptors: (*Economics, New Mexico), (*New Mexico, Economics), (*Forestry, New Mexico), Trees, Infections.

Identifiers: Area redevelopment, Indian reservations.

CONCLUSIONS: The total commercial forested area of 12,892 acres was sampled by 478 1/5-acre plots resulting in a total gross volume of 40,685,480 board feet Scribner Scale at a statistical accuracy of plus or minus 4.37% for trees 12 inches Dbh and larger. The total gross cubic foot volume for trees 6-10 inches Dbl is 2,226,566 cubic feet. Of the total board foot volume, mistletoe infection is as follows: no infection, 82.8%; light infection, 9.2%; heavy infection, 8.0%. It is apparent a substantial volume of timber can and should be harvested from these timbered areas. The data listed will provide the basis for harvesting and other forest management plans. (Author)

PB-170 276 **Field 5C, 8F, 8G**
CFSTI Prices: HC$8.35 MF$2.25
Texas Univ., Austin. Bureau of Economic Geology.
ROCK AND MINERAL RESOURCES OF EAST TEXAS,
by W. L. Fisher, C. R. Chelf, C. A. Shelby, L. E. Garner, and D. E. Owen. Jun 65, 449p Rept. of Investigations-54
Availability: Original document in color until exhausted. Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Economics, Texas), (*Texas, Economics), (*Minerals, Texas), Industries, Rock (Geology), Clay minerals, Cement, Pigments, Sand, Gravel, Asphalt, Rock salt.

Identifiers: Area redevelopment, Peat, Lignite, Sodium chloride.

RECOMMENDATIONS: Development of the mineral industry in East Texas could be planned and guided better with comprehensive market analyses and forecasts in the adjacent large industrial districts. Such analyses would indicate kind and amount of mineral materials consumed, distribution of consumption by area and by industry, specifications of raw materials, current source of supply, and estimation of future demand. Data on capitalization and operation costs in the nonmetallic mineral industry are generally lacking or incomplete. Studies designated to develop such information would promote stable and sound investments in mineral ventures. Engineering studies involving beneficiation of marginal deposits and additional or extended testing of mineral raw materials are needed. Additional geologic study of the occurrence, distribution, and origin of mineral deposits of the area, and, especially, detailed mapping, exploratory drilling, and site development are needed. (Author)

PB-170 278 **Field 5C, 8F**
CFSTI Prices: HC$2.00 MF$0.50
First Research Corp., Miami, Fla.
OVERALL ECONOMIC DEVELOPMENT PROGRAM MIDDLE KENTUCKY RIVER VALLEY PROGRAM EVALUATION AND RECOMMENDATIONS FOR ACTION.
Oct 62, 40p
Contract Cc-5920

Descriptors: (*Economics, Kentucky), (*Kentucky, Economics), (*Industries, Kentucky), Pipes, Transportation, Population, Employment, Agriculture, Processing, Wood, Forestry, Commerce, Mineral products, Recreation, Coal, Mining engineering.

Identifiers: Area redevelopment, Tourist industry.

Contents: Middle Kentucky River Valley OEDP; Review and Field Survey. Recommendations for action: (1) Forest based industries: (a) Wood harvesting, processing and handling industries; (b) Finished wood products; (2) Agribusiness; (3) Mineral-associated industries: (a) Coal pipelining industry; (b) Other mineral-associated industries; (4) Community development; (5) Tourism.

PB-170 279 **Field 5C, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Checchi and Co., Washington, D. C.
A PRE-FEASIBILITY STUDY OF PROJECTS PROPOSED BY HIDDEN VALLEY RANCH, INC., CALHOUN COUNTY, ILLINOIS.
Nov 64, 74p
See also AD-170 246.

Descriptors: (*Economics, Illinois), (*Illinois, Economics), (*Recreation, Illinois), Feasibility studies, Costs, Children, Natural resources.

Identifiers: Area redevelopment, Tourist industry, Recreation facilities, Motels, Fish and wildlife, Skiing.

The owners of the property have proposed a dude ranch-motel, a children's camp, a ski operation, and a hunting lodge with shooting preserve. The financial outlook for the projects as proposed is poor. If the full range of expenses is added to the owners' estimates, all four projects will operate at a loss. An alternative approach is suggested that is based on reducing the number of projects and capital costs. The property should be considered also for possible use as a public park.

PB-170 280 **Field 5C, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Bureau of Outdoor Recreation, Philadelphia, Pa. Northeast Regional Office.
OUTDOOR RECREATION RESOURCES OF SOUTHERN LAUREL HIGHLANDS, PENNSYLVANIA. VOLUME I. FINDINGS AND RECOMMENDATIONS.
Aug 64, 78p

Descriptors: (*Economics, Pennsylvania), (*Pennsylvania, Recreation), (*Recreation, Pennsylvania), Roads, Industries, Museums, Mountains, Mining engineering, Coal, Water pollution, Forestry, History, Museum.

Identifiers: Area redevelopment, Recreation facilities, Tourist industry.

RECOMMENDATIONS: The development of four major outdoor recreation and tourism complexes in the Southern Laurel Highlands should be undertaken. Each of these complexes would be centered around one or more of the major outdoor recreation attractions at Big Sandy Creek, Fort Necessity, Ohiopyle, Youghiogheny Reservoir, and impoundments on Laurel Hill and Loyalhanna Creeks. The State of Pennsylvania should give consideration (1) to providing better road access interconnections between the major outdoor recreation complexes in the Southern Laurel Highlands area, (2) to providing more direct access to these areas from the existing and planned arterial highways, (3) to assuring the continued attraction of the seven gorges through the major ridges by protecting these gorges as 'Scenic Preservation Areas,' and, (4) to establishment of priorities for land uses on the three major ridges and along major rivers adjacent to them. Smaller supplementary outdoor recreation developments should be encouraged to broaden the range of recreation opportunities and interests in the Southern Laurel Highlands. (Author)

PB-170 281 **Field 5C, 8F**
CFSTI Prices: HC$5.00 MF$1.00
Bureau of Outdoor Recreation, Philadelphia, Pa.-Northeast Regional Office.
OUTDOOR RECREATION RESOURCES OF SOUTHERN LAUREL HIGHLANDS, PENNSYLVANIA. VOLUME II, SECTION A. ECONOMIC ASPECTS. SECTION B. HISTORIC STUDY. SECTION C. SUPPORTING DATA TO THE FINDINGS AND RECOMMENDATIONS,
by Paul A. W. Wallace. Aug 64, 154p
Prepared in cooperation with Pennsylvania State Univ., University Park. Dept. of Economics and Historical and Museum Commission, Pennsylvania, Pa. See also PB-170 280.

Descriptors: (*Economics, Pennsylvania), (*Pennsylvania, Recreation), (*Recreation, Pennsylvania), Industries, Employment, Transportation, Roads, History, Mining engineering, Coal, Water pollution, Forestry.

Identifiers: Area redevelopment, Recreation facilities, Tourist industry.

For abstract, see T 66 15.

PB-170 282 **Field 5C, 8F**
CFSTI Prices: HC$5.00 MF$1.00
Little (Arthur D.) Inc., Cambridge, Mass.
INDUSTRIAL-DEVELOPMENT OPPORTUNITIES FOR THE PORT OF MONROE.
Final rept.,
Dec 62, 170p
Contract Cc-5934

Descriptors: (*Economics, Michigan), (*Michigan, Industries), (*Industries, Michigan), Water traffic, Shipping (Marine), Harbors, Site selection, Food, Processing, Storage, Petroleum industry, Metals, Commerce, Warehouses, Distribution (Economics).

Identifiers: Area redevelopment, Industrial parks.

It is concluded that there are opportunities of attracting several new industries among which are companies requiring or traditionally selecting water-oriented sites. The most important economic asset possessed by Monroe, is the availability of good, inexpensive, publicly controlled industrial land immediately adjacent to navigable water. Other elements of Monroe's economic environment, such as labor and taxes, are more or less comparable with those of surrounding industrial ports. Conclusions reagrding industrial opportunities for the Port of Monroe are presented and organized by broad industrial classifications. Where appropriate, the presentation of each industry classification is broken down into three sections: one covering the most promising immediate opportunities; another, the long-range possibilities; and a third, potential non-water-oriented industry. The specific industries discussed are: Food Processing; Warehousing and distribution; Petroleum refining; and Fabricated metals. The non-water-oriented industries are typically interested in small sites. Careful consideration should therefore be given to development of the 145-acre track just west of the Detroit-Toledo Expressway as an organized industrial district or park.

PB-170 285 **Field 5C, 11F, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Turck (F. B.) and Co., Inc., New York.
COLORADO METAL REFINING STUDY.
Preliminary rept. on phase 1.
15 Oct 63, 60p
Contract Cc-6037

Descriptors: (*Economics, Colorado), (*Colorado, Refining (Metallurgy)), (*Refining (Metallurgy), Colorado), Ores (Metal sources), Zinc, Lead, Processing, Blast furnaces, Feasibility studies.

Identifiers: Area redevelopment.

An investigation was made to determine the technical feasibility of the imperial smelting process with respect to the smelting of Colorado lead/zinc sulfide ores and concentrates.

PB-170 293 **Field 5C, 8F**
CFSTI Prices: HC$4.00 MF$1.00
Bartholomew (Harland) and Associates, St. Louis, Mo.
ECONOMIC POTENTIAL OF RECREATION AT THE BIG BEND RESERVOIR, SOUTH DAKOTA,
by Eldridge Lovelace. Mar 63, 138p
Contract 14-20-0650-1054
Prepared in cooperation with Child (John) and Co. and Kirkham (Michael) and Associates.

Descriptors: (*Economics, South Dakota), (*Recreation, Economics), (*South Dakota, Recreation), Feasibility studies, Population, Commerce, Industries, Costs, Employment, Roads, Dams, History, Lakes, Piers, Boats.

Identifiers: Recreation facilities, Area redevelopment, Tourist industry, Indian reservations, Fish and wildlife, Reservoirs.

The recreational facilities proposed are not only financially feasible but are actually quite attractive as an investment. While there would be a loss the first two years, the third year and fourth year would show about a 10 percent profit on the equity investment and by the seventh year the profit on the equity investment might be in excess of 20 percent. When the loss for the first two years is taken into consideration the total equity required becomes $875,000. We conclude that the project is one well worth undertaking, both from the financial standpoint and from the standpoint of the economic effect upon the area. In essence, what it would do would be to bring approximately one million dollars of new money a year into the area. While some of this might come anyway, no matter what type facilities were provided, so large an amount of spending could not possibly be obtained without following a program such as that suggested herein accompanied by a sizable amount of promotion. While the program is attractive financially, this is only true because of the special circumstances that would be possible. It is not a program that would interest a private investor.

PB-170 298 **Field 5C, 8F**
CFSTI Prices: HC$5.00 MF$1.00
Singmaster and Breyer, New York.
FEASIBILITY STUDY OF CHEMICAL INDUSTRY IN SOUTHWESTERN PENNSYLVANIA.
28 Aug 63, 163p
Contract CC-6085

Descriptors: (*Economics, Pennsylvania), (*Pennsylvania, Chemical industry), (*Chemical industry, Pennsylvania), Chemicals, Plastics, Labor, Natural resources, Transportation, Coal, Salts, Costs, Population, Employment.

Identifiers: Area redevelopment.

Sectors of the chemical industry were investigated to determine if any are feasible for the nine-county area of Southwestern Pennsylvania. Nine specific industries have been selected as being appropriate for further study. Of these, three show the greatest promise for development into profitable enterprises: Chemicals from Coal; Chemicals from Salt; and Plastics. A central Pickle Liquor Processing Plant is also considered as having great promise because of the steel industry located within the area. An Aluminum Reduction Plant would be feasible only if low-cost power were available. The attractiveness of the other listed industries would require market surveys to indicate their relative importance to the area. In selecting the list of industries to be further examined in detail, a rating system was applied to factors essential for the evaluation of each industry or segment of an industry. These factors were proximity to markets, competitive position, labor supply, utility costs and raw materials. It is our opinion that Southwestern Pennsylvania does show promise as a location for new chemical industries but it must compete with major industrial areas all over the United States.

PB-170 302 **Field 5C, 2B, 6H, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Missouri Univ., Columbia. Agricultural Experiment Station.
THE ECONOMIC FEASIBILITY OF COMMERCIAL FRUIT AND VEGETABLE PRODUCTION AND PROCESSING IN THE MISSOURI DELTA.
Special rept.,
by James L. Pearson, and Thomas G. Brown.
1965, 61p SR-69-4/66/21/2M
Prepared in cooperation with Department of Agriculture, Washington, D. C., Marketing Economics Division and Florida Agricultural Experiment Stations, Gainsville.

Descriptors: (*Economics, Missouri), (*Missouri, Agriculture), (*Industries, Missouri), Deltas, Production, Processing, Irrigation systems, Feasibility studies, Fruits, Vegetables, Freezing Industrial plants, Employment, Commerce, Management planning, Labor, Costs, Wages.

Identifiers: Area redevelopment, Food industry.

The purpose of this study was to determine the economic feasibility of producing fruits and vegetables and the practicability of establishing one or more processing plants in the area. The feasibility of operating a freezing or canning plant was studied. Annual output of the freezing plant would be 14,475,000 pounds while the output of the canning plant would be 966,287 case equivalents of 24 number 303 cans. An analysis of costs and revenues for each plant indicates that net profit after taxes would be $126,943 for the freezing plant and $56,846 for the canning plant. The freezing plant would employ approximately 62 seasonal laborers and 33 full-time employees, including management, with an annual payroll of $258,990. The canning plant would employ 88 seasonal laborers and 18 full-time employees, including managment, with an annual payroll of $244,398. In manyear equivalents, the freezing and canning plants employ 72 and 70 workers, respectively, in labor and management positions. Production of the necessary vegetable raw materials would increase net and gross farm income of the area by almost $75,000 and $595,000, respectively. Seasonal day laborers currently underemployed on farms in the area would be able to work in additional 102,000 hours in the production of vegetable crops. This would increase their income $61,200 annually. The results of this study show that production and processing of vegetables are economically feasible. (Author)

PB-170 310 **Field 5C, 8F**
CFSTI Prices: HC$5.00 MF$1.25
Wolf Management Services, Chicago, Ill.
KODIAK, ALASKA ITS RESOURCES ITS ECONOMY AND ITS POTENTIAL, WITH A REVIEW OF THE IMPACT OF THE KODIAK-TO-MAINLAND FERRY.
Oct 65, 200p
Contract C-217-65 (Neg)

Descriptors: (*Economics, Alaska), (*Alaska, Economics), (*Industries, Alaska), (*Water traffic, Alaska), Transportation, Urban planning, Seafood, Commerce, Labor, Power supplies, Water supplies, Agriculture, Forestry, Natural resources, Recreation, Military facilities, Wood, Employment, Costs, Wages, Boats.

Identifiers: Area redevelopment.

The work summarized by this report was originally commissioned to assess the impact of the Kodiak-to-mainland ferry service upon the economy of the city; to evaluate the economic utility of a proposed ferry dock and terminal; and to examine the 'investment climate' of the Kodiak area with a

view to delineating specific investment opportunities. Accordingly, the report concerns itself with each of these areas...but it is not limited to them. The authors believe that the Kodiak experience of the past five years furnishes a valuable case history of economic development, some of the lessons of which may have broad application elsewhere. Where such causes and effects have been found to be well defined, they have been emphasized in the text. (Author)

PB-170 311 **Field 5C, 8F**
CFSTI Prices: HC$5.00 MF$1.25
Lowell Technological Inst. Research Foundation, Mass.
A STUDY OF FACTORS AFFECTING INDUSTRIAL GROWTH IN NORTHERN MIDDLESEX COUNTY AND ENVIRONS.
Final rept.,
by Allen S. Powell, Thomas Murphy, and Paul J. Angelo Jr. Jun 65, 200p
Contract Cc-6178

Descriptors: (*Economics, Massachusetts), (*Massachusetts, Economics), (*Industries, Massachusetts), Electronics, Laboratories, New Hampshire, Water pollution, Air pollution, Employment, Water supplies, Sewage, Transportation, Commerce.

Identifiers: Area redevelopment, National Aeronautics and Space Administration.

RECOMMENDATIONS: A major interstate development region consisting of sub-regions centered about Nashua, New Hampshire and Lowell, Lawrence, Haverhill, Newburyport and Gloucester, Massachusetts should be established. Long-range planning and review of operations of the interstate development region should be delegated to an Interstate Center for Regional Development patterned after contractually-operated national scientific laboratories. The recommended Center for Regional Development should operate Technology Improvement Laboratories. Programs should be undertaken to overcome water and air pollution, provide adequate water, sewage and waste disposal systems, develop more economical transportation methods, engineer new materials handling systems and analyze the needs for other improved industrial facilities. Human resources should be better utilized. A project to expand export business of Study Area industries and to seek new opportunities to bring in bulk imports for conversion should be instituted.

PB-170 312 **Field 5C, 5A, 8F**
CFSTI Prices: HC$7.00 MF$1.75
Wolfe (Harry C.), Bartow, W. Va.
REVIEW AND EVALUATE SELECTED OEDPs.
1962, 390p

Descriptors: (*Economics, Employment), (*West Virginia, Economics), (*Ohio, Economics), Management planning, Population, Costs.

Identifiers: Area redevelopment.

The report presents reviews and appraisals of provisional overall economic development programs with recommendations for further planning steps. The areas covered are Putnam, Mason, Boone, Wetzel, Tyler, Logan, and Gilmer counties in West Virginia and Athens, Highland, Jackson, Morgan, Meigs, Adams, and Monroe counties in Ohio.

PB-170 314 **Field 5C, 8F**
CFSTI Prices: HC$2.00 MF$0.50
Regional Industrial Development Corp. of Southwestern Pennsylvania, Pittsburgh.
COMMUNITY ASSISTANCE TO EXISTING INDUSTRY, A STRATEGY AND FEASIBILITY STUDY.
Mar 66, 48p

Descriptors: (*Economics, Pennsylvania), (*Pennsylvania, Industries), (*Industries, Management engineering), Management planning, Urban planning, Feasibility studies, Commerce.

Identifiers: Area redevelopment.

A pilot interview and assistance program was organized covering a diverse group of 45 medium-size industrial firms or branch plants (employing over 100 persons). The interviewing was conducted by a special consultant to RIDC (Regional Industrial Development Corporation). Follow-up on assistance was provided through RIDC, the electric utilities, and local community development groups, with RIDC acting as nominal coordinator. Recommendations: (1) A coordinated intelligence and assistance effort should be established involving RIDC, the electric utilities, and the local community development groups. (2) RIDC should stimulate and assist the utilities in establishing existing industry intelligence and assistance functions within their organizations on a basis which will assure effective and coordinated action. On a continuing basis, RIDC should seek to develop improvements in the intelligence system, seek to achieve a broader range and depth of assistance resources, and provide special assistance in problem situations that are beyond the scope of the utility company programs. (3) The electric utilities should organize and staff themselves to coordinate and, in some cases, carry out specific elements of an effective intelligence and assistance effort for all existing industries within their service areas. The local community industrial development groups should be expected to perform useful intelligence and assistance functions. (Author)

PB-170 316 **Field 5C, 8F**
CFSTI Prices: HC$3.00 MF$0.50
Concord Coll., Athens, W. Va. Center for Economic Action.
UTILIZING A COLLEGE'S RESOURCES TO PROVIDE TECHNICAL ASSISTANCE TO SMALL BUSINESS IN SOUTHERN WEST VIRGINIA.
Jul 64, 55p
Contract Cc-6019

Descriptors: (*Economics, West Virginia), (*West Virginia, Commerce), (*Commerce, West Virginia), Employment, Management engineering, Management planning, Universities, Libraries.

Identifiers: Area redevelopment, Small business.

The Concord College Center for Economic Action was organized to use the resources of Concord College to provide technical assistance to small businesses in a ten county area in southern West Virginia. The work of the individual faculty consultants with the clients generally divided itself into three specific phases: (1) an investigation of the services required; (2) a study of the situation and the formulation of specific recommendations; and (3) implementation of the recommendations. During the project year, the Center identified twenty-nine separate clients which possess an estimated potential of 220 new permanent jobs. Seventeen of these clients with a potential for providing 142 new permanent jobs received specific recommendations from the faculty consultants. In every case it has been obvious to both the Director and the consultants that their contact has stimulated new thinking on the part of the businessmen. Sometimes the conferences with the consultants helped the client to formulate some defined (though feasible) plan that he had long since abandoned. On other occasions, the Center was able to provide the kind of incentive and encouragement that the client needed to implement plans that he had long considered.

PB-170 318 **Field 5C, 8F**
CFSTI Prices: HC$2.00 MF$0.50
Mead Carney International Co., Darien, Conn.
EXPANDING EXISTING INDUSTRIES TO CREATE NEW JOB OPPORTUNITIES IN FULTON COUNTY, NEW YORK.
Final rept.
1966, 41p
Contract C-284-65 (NEG)
Proj. 1014

Descriptors: (*Economics, New York), (*New York, Economics), (*Industries, New York), Employment, Labor, Commerce, Leather.

Identifiers: Area redevelopment.

CONCLUSION: During the past decade Fulton County has lagged behind both New York State and the Nation in its economic growth. Industries have closed-down or moved out of the area; the majority of high school and college graduates leave the community and the general atmosphere is one of complacency and apathy. This is basically due to extremely low productivity in the dominant leather and leather goods industry; an ultra conservative attitude toward innovation and particularly toward diversification; and a definite scarcity of risk capital from the banking community even when guaranteed by the federal government. There is genuine interest, cooperation and participation on the part of certain civic and business leaders and public officials who are devoting substantial time and effort during, and well beyond normal business hours, to achieve the objectives of promoting business expansion, increased employment and economic growth. (Author)

PB-170 319 **Field 5C, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Saunders (W. B.) and Co., Washington, D. C.
ECONOMIC FEASIBILITY OF ESTABLISHING A REGIONAL DISTRIBUTION CENTER IN THE GREATER WILKES-BARRE, PENNSYLVANIA AREA, ITS ECONOMIC IMPACT AND THE PHYSICAL FACILITY.
Jan 66, 70p

Descriptors: (*Economics, Pennsylvania), (*Pennsylvania, Commerce), (*Commerce, Pennsylvania), (*Distribution (Economics), Pennsylvania), Costs, Food, Chemicals, Electrical equipment, Population, Railroads, Transportation, Roads, Employment, Wages, Warehouses, Site selection.

Identifiers: Area redevelopment.

The basic idea for the creation of a Wilkes-Barre/Scranton regional distribution center, was found to be economically viable. Analysis of distribution systems for specific commodities and shippers, primarily for markets in the Megalopolitan Corridor, showed that significant savings in transportation costs would be available through the use of the proposed facility. It was found that a warehouse of a 100,000-square foot area on one floor would require an investment of approximately $650,000 and could be operated profitably at competitive rates and charges. Growth patterns projected for the primary markets which may be served through the proposed facility indicate that the potential for a Wilkes-Barre/Scranton distribution center may reach major proportions and may support a complex of warehouses, truck terminals, truck driver lodgings and restaurant facilities within a few years of its establishment. Prospective economic impact resulting from the proposed facility was found to be significant in terms of new employment opportunities and the resulting high average wages. The physical facility to be constructed in the first stage should have a gross floor area of 100,000 square feet with a 20-foot clearance under piles. It must provide a full range of services excepting cold and frozen storage.

PB-170 320 **Field 5C, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Northern Wisconsin Development Project, Wausau.

ANNUAL REPORT (1st), JULY 1, 1964-JUNE 30,1965.
30 Jun 65, 84p
Contract Cc-6184
Proj. 836

Descriptors: (*Economics, Wisconsin), (*Wisconsin, Industries), (*Industries, Wisconsin), Wood, Mining engineering, Agriculture, Employment, Population, Wages, Management planning, Site selection, Recreation, Industrial production, Commerce, Feasibility studies.

Identifiers: Area redevelopment, Wood industry, Tourist industry.

The 19 northern counties of Wisconsin represent more than one-third of the state's area. Lumbering and mining industries once constituted the basis of the economy of the north, but during the past two decades these have declined drastically. This has left a hard core of unemployment among the region's 300,000 inhabitants. The Northern Wisconsin Development Project was established as a result of a concern shared by a number of University of Wisconsin faculty members about this long-term economic decline. NWDP is action-oriented and is based on the assuption that self-help through better management of existing resources is the most effective long-range approach to economic improvement. This emphasis is substantiated by recent studies showing that about 80% of industrial growth comes from the expansion of existing industries. The primary objective of the project has been to provide management counsel to a selected group of manufacturers chosen on the basis of growth potential, need for assistance and management's willingness to cooperate. In addition to this work with existing companies, attention has been given to the development of several new businesses through the conduct of feasibility studies. Some help has been made available to community leaders seeking assistance with their various developmental programs.

PB-170 321 **Field 5C, 11L, 8F**
CFSTI Prices: HC$5.00 MF$1.00
Little (Arthur D.) Inc., Cambridge, Mass.
FEASIBILITY OF ESTABLISHING A NON-INTEGRATED TISSUE MANUFACTURING FACILITY AT TWO HARBORS, MINNESOTA.
20 Sep 65, 185p
Contract C-66473

Descriptors: (*Economics, Minnesota), (*Minnesota, Paper industry), (*Paper industry, Minnesota), Feasibility studies, Industrial plants, Costs, Factories, Commerce, Paper, Wood pulp, Labor.

Identifiers: Area redevelopment.

The principal conclusion is that, with the economic advantages available to Two Harbors, Minnesota, an opportunity does exist for the establishment of a non-integrated tissue manufacturing venture in that city. One advantage is the replacement value of the abandoned DM and IR property which is presumably available to this operation. The second principal advantage of the Two Harbors site is the economic incentive available to that location by virtue of its depressed (labor surplus) classification. This economic incentive is in the form of financing via tax-free municipal bonds with a lease-back arrangement of the manufacturing facility to a potential producer. Against the criteria used in this analysis, we estimate a net after-tax return of 26% on a $1,556,000 equity. This equity position is made up of a year's prepayment of the lease ($456,000) plus initial working capital ($1,100,000). A number of specific conditions and limitations need to be applied to insure the viability of this venture. Potential choices should be restricted to organizations which enjoy a position of substantial strength in the tissue paper markets of the midwestern portion of the United States. This would include organizations which are currently merchants or dealers of tissue paper products in the aforementioned area, and would also include current manufacturers supplying these markets. The establishment of the proposed venture would provide good employment opportunities for the Two Harbor area.

PB-170 328 **Field 5C, 11F, 8F, 8I**
CFSTI Prices: HC$2.00 MF$0.50
Cuyuna Range Minerals Research, Inc., Duluth, Minn/
FILLING GAPS IN THE EXISTING TECHNOLOGY AND RESEARCH UNDER WAY ON CUYUNA RANGE ORES.
Final rept.
4 Feb 66, 41p
Proj. 893

Descriptors: (*Economics, Minnesota), (*Minnesota, Ores (Metal sources)), (*Ores (Metal sources), Minnesota), Mining engineering, Preparation, Heat treatment, Manganese, Sulfides, Refining (Metallurgy), Iron industry, Sulfur, Iron, Power supplies, Fuels, Transportation, Great Lakes.

Identifiers: Area redevelopment.

The Cuyuna Range area appears to have the following advantages: A substantial supply of available iron units in separate deposits (i.e. Todd County) and in conjunction with the manganese units. A very substantial supply of available manganese units. A sulfide deposit which is of current interest because of the world sulfur consumption exceeding production as well as the fact that a high grade iron by-product will result. A settled area with established communities and all facilities. Available electric power. Four competitive types of available fuel--crude oil, natural gas, lake coal, Dakota lignite. Railroads particularly equipped for handling iron ore materials. The availability of lake transportation at Superior. Barge transportation down the Mississippi River from St. Paul. The St. Lawrence Seaway. A favorable tax climate (with particular reference to the Minnesota statutes materially assisting the mining of taconites, semi-taconites and sulfides). (Author)

PB-170 332 **Field 5C, 2B, 8A, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Greater Marshall Industries, Tex.
PROPOSAL FOR A FEASIBILITY STUDY PILOT PROJECT GRANT TO HARVEST AND PROCESS AQUATIC PLANTS FROM CADDO LAKE,
by Sylvin R. Lange. Sep 62, 89p
Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Economics, Texas), (*Texas, Agriculture), (*Agriculture, Texas), Marine biology, Plants (Botany), Feasibility studies, Algae, Control, Bovines, Food, Biochemistry, Commerce, Lakes, Recreation, Employment, Costs, Industries.

Identifiers: Tourist industry, Area redevelopment, Feed.

The objectives of this feasibility study are to: (1) Set up a pilot plant operation for harvesting and processing Caddo Lake aquatic plants; (2) Harvest and process the aquatic plants to supply controlled livestock feeding trials and biochemical laboratory analysis; (3) Conduct comprehensive livestock feeding trials to prove the nutritional values of Caddo aquatic plants; (4) Determine the market potential for the processed aquatic plants; Based on the results of this feasibility study, a new inudstry would be established with the objectives to: (1) Harves the aquatic plants on a continuing basis and restore Caddo Lake as a tourist attraction; (2) Establish a permanent industry at Caddo Lake processing marketable livestock (cattle, poultry, swine) feed supplements; (3) Provide new jobs directly involved with harvesting and processing the aquatic plants; (4) Restore tourism jobs and businesses at Caddo Lake' (5) Provide feed supplements needed by the livestock industries of East Texas. (Author)

PB-170 335 **Field 5C, 8F**
CFSTI Prices: HC$6.00 MF$1.50
Essex County Economic Research Corp., Mass.
ESSEX COUNTY, MASSACHUSETTS: A NINE POINT PROGRAM FOR ECONOMIC DEVELOPMENT.
1964, 291p
Contract Cc-6156

Descriptors: (*Economics, Massachusetts), (*Massachusetts, Economics), Recreation, Transportation, Labor, Industries, Site selection, Commerce, Employment.

Identifiers: Area redevelopment, Tourist industry.

Contents: Tourism development, impact of transportation, labor force size and trends, federal assistance, industrial potentials and obstacles, growth industries, industrial and commercial sites, investment needs for economic development, advice and guidance.

PB-170 337 **Field 5C, 8F**
CFSTI Prices: HC$3.00 MF$0.50
Institute for Regional Development, Athens, Ohio.
OHIO: PROVIDING PRACTICAL ASSISTANCE IN COMPREHENSIVE ECONOMIC DEVELOPMENT.
Final rept., 1964-1965.
15 Feb 66, 58p
Prepared in cooperation with Economic Development Administration, Washington, D. C.

Descriptors: (*Economics, Ohio), (*Ohio, Economics), (*Universities, Economics), Employment, Population, Natural resources, Transportation, Recreation, Commerce, Training, Industries, Urban planning, Management planning, Management engineering.

Identifiers: Area redevelopment, Tourist industry.

The Institute for Regional Development was established with the idea that Ohio University would formally commit itself to the problem of providing practical assistance in comprehensive economic development. The Economic Development Administration made the establishment of the I. R. D. possible through a technical assistance grant. The development needs of a region are the lack of leadership and development organizations, the misuse of vital resources, the deterioration or lack of community facilities, the inadequate transportation network, the disadvantages of hill and valley topography, and the lack of information and capital. The scope of the Institute's program was designed with three principals in mind -- program 'fit', program balance, and program responsibility. Specifically, the program was built upon the needs of the region and the demonstrable ability of the University to provide continuing technical assistance. As a result, the essential work programs for the Institute for Regional Development were identified as Business and Industry, Community Development, Resource Development, and Recreation and Tourism. Following basic program design, methods were devised and techniques developed to carry each program forward. The accomplishments of the Institute during its first year of business were, for the most part, encouraging.

PB-170 339 **Field 5C, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Hammer and Co. Associates, Washington, D. C.
ECONOMIC FEASIBILITY OF LAKEWOOD VILLAGE. A PROPOSED RESORT IN HUMPHREYS COUNTY, TENNESSEE.
28 Dec 64, 91p
Contract C-15-65
Availability:Original document in color until exhausted.

Descriptors: (*Economics, Tennessee), (*Tennessee, Economics), (*Recreation, Economics), Employment, Costs, Lakes, Com-

merce, Feasibility studies, Water supplies, Sewage, Design, Management planning.

Identifiers: Area redevelopment, Tourist industry, Recreation facilities.

Summary: (1) Regional market. In the Tennessee Sector of the Kentucky Lake Region, recreation visitors are projected to increase from about 4,000,000 in 1963 to more than 15,000,000 by 1985. More than 10 percent of these visitors will be seeking overnight accommodations. (2) Lakewood village market potential. A major resort facility on the Lakewood Village site will be able to capture a substantial share of this potential market. We estimate that potential patronage would total 1,141,000 visitors in 1968 and would increase to 2,423,200 in 1985. (3) An estimated $4,844,000 would be required to finance the planning and construction of this project and ready it for operation. (4) Gross revenues from the project would total an estimated $918,600 in 1968, the first full year of operation, increasing sharply to $1,405,000 by 1973 and to $1,664,000 in 1985. Total project expenditures are estimated at $870,450 in 1968, leaving net revenues of $48,150 before debt service and depreciation. Net revenues will increase to $263,050 in 1973, and to $380,250 in 1985, again before debt service or depreciation. (5) These revenues would not be sufficient to obtain conventional financing for the Lakewood Village project, but financing at 3 and 5/8 percent through the ARA loan assistance program would be feasible. (6) This analysis has identified a number of deficiencies in the original proposal that must be met to insure the operational and financial success of the project.

PB-170 340 **Field 5C, 8F**
CFSTI Prices: HC$6.00 MF$1.25
Raymond, White and Locke, Associates, Utica, N. Y.
SELECTED ONEIDA COUNTY, NEW YORK INDUSTRIAL STRUCTURES AND SITES SURVEY.
1965, 266p
Contract C-127-65
Proj. 948
Prepared in cooperation with Bailey (Russell D.) and Associates, Utica, N. Y.

Descriptors: (*Economics, New York), (*New York, Industries), (*Industries, Site selection), Buildings, Data, Maps, Industrial plants, Transportation, Power supplies, Water supplies, Sewage, Labor.

Identifiers: Area redevelopment.

The report provides an inventory of selected industrial sites, and industrial structures within Oneida County, New York. The criteria established for selection of sites and structures in this report include location, transportation, topographic, service, zoning and availability considerations. The format has been designed to provide a ready analysis or each site and structure selected for evaluation, and to facilitate the maintenance of a current inventory. A further advantage of this format is that it allows the removal of individual units for promotional purposes.

PB-170 537 **Field 5C, 13C**
CFSTI Price: HC$9.60
RAND Corp., Santa Monica, Calif.
A MATERIALS-INPUT INDEX OF SOVIET CONSTRUCTION, REVISED AND EXTENDED,
by Raymond P. Powell. 28 Sep 59, 94p RM-2454

Descriptors: (*Construction, USSR), (*Materials, Construction), (*Economics, USSR), Statistical analysis, Costs, Indexes.

The estimates reported are a revision and -- for 1956-1958-- extension of the estimates of Soviet construction in constant prices presented in A Materials-Input Index of Soviet Construction, 1927/28 to 1955, RAND Research Memoranda-1872 and 1873, February 14, 1957 (AD-133 014 and AD-133 015). Materials inputs into construction are taken as a substitute measure of construction outputs. The principal object in revising the materials-input index was to replace and supplement statistics used in the original study for domestic outputs of construction materials with more reliable and comprehensive data which have been taken from TsSU, Promyshlennost' SSSR, Moscow, 1957, and, to a lesser extent, from other statistical handbooks and related official sources. A secondary object of the revision was to improve certain subsidiary estimates, especially those of construction costs and prices, which were intended in the original study (cf., RM-1873, p. 418) solely to provide checks on the accuracy of the estimates of materials inputs.

AD-450 405 **See Field 5D**

AD-634 191 **See Field 1B**

AD-634 230 **See Field 5D**

AD-634 244 **See Field 5D**

AD-634 331 **See Field 5A**

AD-634 589 **See Field 5D**

ORNL-IIC-6 **See Field 18B**

5D. HISTORY, LAW, AND POLITICAL SCIENCE

AD-279 464 **Field 5D, 5J**
CFSTI Price: HC$6.60
Pittsburgh Univ., Pa.
THE FUTURES OF THE COLD WAR - SOME RESULTS OF PROJECT OUTCOMES -,
by Jiri Nehnevajsa. Mar 62, 70p
Contract AF 49 (638)-1116
AFOSR-2315
Rept. on Proj. Outcomes.

Descriptors: (*Cold war, Public opinion), (*Political science, Public opinion), Social psychology, Theory, Government (Foreign), Decision making, Communism, Probability.

Identifiers: Outcomes project.

AD-279 919 **Field 5D**
CFSTI Price: HC$3.60
Pittsburgh Univ., Pa.
ANTICIPATED CHANGES IN COMMUNIST NATIONS,
by Stanley E. Shively, and Martin Gannon. Mar 62, 37p
Contract AF 49 (638)-1116
AFOSR-2317
Rept. on Proj. Outcomes.

Descriptors: (*Political science, Communism), (*Public opinion, Communism), (*Communism, Probability), Poland, East Germany, Hungary, Czechoslovakia, Bulgaria, Vietnam, North Korea, Rumania, Albania.

Identifiers: Outcomes project.

It was felt by the respondents that Poland, East Germany, Hungary and Czechoslovakia - in that order - are more likely to change away from Communism than are Bulgaria, North Viet-Nam, North Korea, Albania and Rumania. The expectancy of political re-alignments away from Communism taking place in the next five years in countries which are currently Communistic is generally higher than comparable expectations that non-Communistic nations will turn toward Communism. In general, the respondents believe that movement away from Communism in the nations under study - if it occurs - is more likely to take the form of anti-Communist revolutions than of the acceptance of national Communism or the institution of a democratic government; further, the acceptance of national Communism is more probable than the institution of a democratic government: The rank order correlations between the nine Communist countries changing through anti-Communistic revolutions, development of national Communism and the institution of a democratic form of government are quite high. The Indian respondents consistently fail to recognize the likelihood that Communist nations are liable to change away from Communism; further, they do not foresee changes in non-Communist countries twoard Communism. (Author)

AD-450 405 **Field 5D, 5C**
CFSTI Prices: HC$15.30
Stanford Research Inst., Menlo Park, Calif.
BOUNDARY CONDITIONS OF THE SINO-INDIAN CONFLICT.
by Francis P. Hoeber, Yuan-Li Wu, William Rood, Maclin Summers, and Ellen Heckler. Jun 63, 157p Technical rept. TR-4320-3
Contract DA-49-092-ARO-10
Proj. SRI-ETU-4320

Descriptors: (*Foreign policy, China), (*Defense systems, India), (*Economics, India), Political science, Effectiveness, Communism, Military strategy, Warfare.

The Sino-Indian border crisis has immediate implications for U.S. policy because this country is committed to the defense of free India. It also has long-range implications for possible and likely actions by Communist China on many fronts. The paper makes a tentative assessment of the political and strategic motivations on both sides of the border and of the economic capabilities of both protagonists. It is found that, in the short run, China is probably undertaking a cheap and very limited adventure in border rectification, but the action may fit a long-range pattern of much broader implications for Chinese expansionism and aggressive diplomacy, vis-a-vis the Soviet Union as well as the West. On the Indian side, it is found that, while military preparation has been devastatingly inadequate, longer-range potentials are very considerable, if they can be mobilized. Divisive political forces have imposed serious limitations on the effectiveness of widespread positive reactions by the Indian people. A special inhibition is fear of impairment of the economic development program, but the paper finds that, with adequate leadership, a large military program could enhance rather than impede economic development. (Author)

AD-634 230 **Field 5D, 5C**
CFSTI Prices: HC$1.00 MF$0.50
Rand Corp., Santa Monica, Calif.
APPLYING ANALYTIC METHODS TO PROBLEMS OF DEVELOPMENT ASSISTANCE,
by J. Farmer. Jun 66, 16p P-3384
Prepared for presentation at Natl. Meeting of Operations Research Soc. of America (29th), Santa Monica, Calif. 20 May 66.

Descriptors: (*Foreign aid, *Operations research), (*Cost effectiveness, Foreign aid), Economics, Foreign policy, Systems engineering.

Identifiers: Underdeveloped countries.

There are several hazards in allocating development assistance funds, such as unintended distortions in infrastructures and the national economy of the recipient causing inefficient employment of the nation's resources, and failure to identify the critical investment level for success of development assistance projects. This paper gives examples of these problems and how analytic techniques can, in many cases, be useful to the decisionmaker. Development assistance problems can still be characterized by difficulties in criteria formulation, data collection or derivation, and identification of resource costs. This paper describes various approaches used by others and illustrates how systems analysis and cost-benefit methods used for business and defense problems can be adapted for development assistance. It suggests methods adapted from economic analysis which can be used to test criteria for validity and identify the scarce resources which should be the basis for costing. (Author)

AD-634 244 **Field 5D, 5C**
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
LATIN AMERICAN AND INDIAN POLITICAL ECONOMY COMPARED: SOME COMPARISONS DERIVED FROM K. B. GRIFFIN'S 'REFLECTIONS ON LATIN AMERICAN DEVELOPMENT,'
by George Rosen. Jun 66, 15p P-3383

Descriptors: (*Political science, *Latin America), (*India, Political science), (*Economics, Latin America), Social sciences, Government (Foreign).

These comments on K. B. Griffin's earlier article, 'Reflections on Latin American Development,' compare the political economy of growth in Latin America, as outlined by Griffin, with the political economy of growth in India. (Author)

AD-634 589 **Field 5D, 5C**
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
FOREIGN ECONOMIC RELATIONS OF THE DEMOCRATIC REPUBLIC OF VIETNAM (1945-1960),
by I. M. Shchedrov. May 66, 12p LT-66-21
TT-66-61572
Trans. of Akademiya Nauk SSSR. Institut Iazyka, Istoriya Materialnoi Kultury, Leningrad, n59 p69-84 1961.

Descriptors: (*Vietnam, *Foreign aid), Political science, Economics, China, USSR.

For abstract, see T 66 15.

AD-634 376 **See Field 5C**

AD-634 741 **See Field 15F**

5E. HUMAN FACTORS ENGINEERING

PB-169 222 **Field 5E, 6N, 1C**
CFSTI Prices: HC$1.00 MF$0.50
Naval Air Material Center, Philadelphia, Pa. Air Crew Equipment Lab.
COCKPIT DESIGN STUDIES; STANDARD COCKPIT MOCKUP: SELECTION OF SUBJECTS FOR AIRCREW STATION DESIGN EXPERIMENTATION,
by E. C. Gifford, and J. Gaito. 12 Feb 57, 16p
NAMC-ACEL318
Proj. TED-NAM-AE-7052-Pt-1
AD-123 424

Descriptors: (*Cockpits, Design), (*Human engineering, Cockpits), (*Anthropometry, Aviation personnel), Factor analysis, Selection, Pressure suits, Morphology (Biology).

The results of the use of the factor analysis technique as an aid in selecting subjects for aircrew station design experimentation are reported. As a prelude to an investigation concerning the effects of various equipment such as the full pressure suit on operational performance, eleven morphological features were selected which were considered critical in defining cockpit dimensions and arrangement and location of various equipment. However, the probability of obtaining subjects who would fall at approximately the same percentile points, relative to a specific population, in each of these features is extremely small. By the use of factor analysis, it was determined that three basic factors were present and the morphological feature or features with the highest loading on each single factor were selected to represent that factor. This technique allowed the use of a more economical procedure which requires that subjects fall at approximately the same percentile points in five morphological features. (Author)

AD-272 647 **See Field 17H**

AD-634 313 **See Field 15C**

AD-634 455 **See Field 18L**

AD-634 575 **See Field 1D**

AD-634 720 **See Field 15E**

PB-169 219 **See Field 17H**

5F. HUMANITIES

N66-15325 **Field 5F**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
LIFE IN SPACE AND HUMANITY ON THE EARTH. A JOINT REVIEW OF FIVE BOOKS,
by S. S. Huang. 1964, 19p NASA-TM-X-56136

Descriptors: *Astronomy, *Galaxy, *Interplanetary space, *Interstellar communication, *Extraterrestrial life, *Star.

5G. LINGUISTICS

AD-634 162 **Field 5G, 17B**
CFSTI Prices: HC$2.00 MF$0.50
Naval Research Lab., Washington, D. C.
PITCH VARIATIONS IN VOCODED VOICE.
Memo. rept.,
by W. M. Jewett. 20 May 66, 33p NRL-MR-1699
Proj. SF-006-11-01
Task 7260

Descriptors: (*Speech, Sound pitch), (*Phonetics, Sound pitch), (*Sound pitch, analysis of variance), Voice communication systems, Background, Noise.

Identifiers: Vocoders.

In the analysis of the KY-537/U channel vocoder for the Bureau of Ships, a study was performed of the pitch variations in the vocoded digital data signal using three untrained male speakers. The results obtained were compared to published data for the pitch perturbations in natural speech for trained speakers. The comparison indicates that statistically the variations in pitch between successive voiced vocoder frames were zero a much larger percent of the time than found in natural speech, and also that large changes in pitch occurred more often than in the reference data. This is partly the result of using a quantization interval in the vocoder that is too large to permit encoding the small pitch variations which account for most of the pitch perturbations that occur in natural speech. The extension of this work using a larger number of speakers under different stress and background noise conditions would yield data of value on the adequacy of the pitch extractor in presently designed channel vocoders, the need for speaker training, and possible constraints on vocoder use. (Author)

AD-634 508 **Field 5G, 9B**
CFSTI Prices: HC$6.00 MF$1.25
Burroughs Corp., Paoli, Pa. Defense, Space and Special Systems Group.
RESEARCH STUDY OF LOGIC DESIGN TRANSLATOR TECHNIQUES.
Final rept.
30 Sep 65, 234p
Proj. 4442

Descriptors: (*Machine translation, Design), Computer logic, Optimization.

During the contract there were three distinct areas of work on the Logic Design Translator (LDT). A section of this report is devoted to each of these areas. Section 2 reports how the programs for the LDT in existence at the initiation of this contract have been maintained. This maintenance included both small corrections and minor improvements to the programs. Section 3 reports how two fundamental extensions to the LDT programs were developed and other possibilities studied. A library facility has been programmed to operate with a revised version of the LDT. A simulator to operate at the register level from the design tables of the LDT has been specified. The four other possible extensions studied, but not incorporated into the LDT, were diagnostic procedures based upon LDT tables, new ways for the designer to specify the control of microsequences, alternative timing algorithms for the LDT programs, and a way to choose the most economical implementation of a system. Section 4 reports how the LDT programs were translated from the existing version in BALGOL for the 220 into ALGOL '60 for the 1604A and ALGOL for the Burroughs B5500. Section 5 contains the conclusions of this study and recommends areas for extension of the LDT. (Author)

PB-169 626 **Field 5G, 9B**
CFSTI Prices: HC$6.60 MF$0.75
Georgetown Univ., Washington, D. C.
GEORGETOWN AUTOMATIC TRANSLATION. GENERAL INFORMATION AND OPERATION MANUAL,
by J. A. Moyne. 1962, 64p
NSF Scientific Documentation Project.

Descriptors: (*Machine translation, Programming (Computers)), (*Programming (Computers), Machine translation), Instruction manuals, Russian language, English language, Automatic, Dictionaries, Computers.

The Georgetown Automatic Translation (GAT) is a result of group effort and cooperation of linguists and programmers. The publication is intended to serve as a manual of operations and reference for the programming system. The system is often referred to as the Direct Conversion system since it started as an undertaking for converting the running Georgetown MT system of the IBM 705 computer into the IBM 709 - 7090 computer system. In the course of conversion, however, several major and minor programs were added to the system and almost all the existing ones were revised and modified. All the programs described in the manual are available in Squoze (SOS Share System) or in absolute binary cards which require no compiler. A system tape is also available for the complete GAT system but the latter will only work with the SOS compiler. (Author)

PB-169 694 **Field 5G**
CFSTI Prices: HC$1.60 MF$0.50
Georgetown Univ., Washington, D. C.
LOCI OF AGREEMENT AND GOVERNMENT STRUCTURES IN SLAVIC,
by Milos Pacak. Jan 62, 13p
Published in Estratto Rivista Methodos, v14 n53 p75-86 1962.

Descriptors: (*Language, Syntax), Grammar, Russian language, English language.

Identifiers: Slavic languages.

The report is concerned primarily with certain syntactic phenomena which are typical of several Slavic languages. Namely: (a) The resolution of the case and number ambiguity of inflected forms with the exception of morphologically homonymous forms: subject-object. (b) The formation of structures of dependency. The simultaneous resolution of case and number ambiguities can be achieved, to a certain extent, by the application of logical tables for agreement structures and government dependencies. The gradual formation of minimal and extended structures of dependency is based on the concept of the admissible compatibility of grammatical forms (required, or primary, and optional, or secondary, dependencies) as opposed to the compatibility of meaning. It is assumed that morphological analysis of the language under consideration has been completed and the patterns of morphological ambiguities established. The re-

port consists of two parts: (a) Agreement structures, and (b) Structures of dependency.

PB-169 695 **Field 5G**
CFSTI Prices: HC$2.60 MF$0.50
Georgetown Univ., Washington, D. C. Inst. of Languages and Linguistics.
MORPHOLOGICAL ABSTRACTION OF ADJECTIVALS IN CZECH,
by Milos Pac, and Hanna Ulatowska. May 62, 23p Rept. no. 27
Occasional papers on machine translations.

Descriptors: (*Syntax, Czechoslovakia), Linguistics, Language.

Identifiers: Adjectives, Czech language.

The class of adjectivals includes pure adjectives and pronominal forms functioning as modifiers. Most adjectivals are inflected for gender, animateness, case, number and degrees of comparison. These features with the exception of the latter are marked by inflectional suffixes.

PB-169 696 **Field 5G, 9B, 5B**
CFSTI Prices: HC$2.60 MF$0.50
California Univ., Berkeley.
A HIGH-SPEED LARGE-CAPACITY DICTIONARY SYSTEM.
Revised ed.,
by Sydney M. Lamb, and William H. Jacobsen Jr. 19 Aug 60, 25p
NSF Scientific Documentation Project. Revision of manuscript received 23 Feb. 60. Mechanical Translations v6 p76-7 Nov. 1963.

Descriptors: (*Dictionaries, Data storage systems), (*Data storage systems, Dictionaries), Vocabulary, Computers, Information retrieval, Machine translation, Russian language.

A system of dictionary organization is described which makes it possible for a computer with 32,000 words of core storage to accommodate a vocabulary of hundreds of thousands of words, with a look-up speed of over a hundred words per second. The central part of the look-up process involves using the first few letters of each word as addresses, one after another. (Author)

PB-170 420 **Field 5G, 5B**
CFSTI Prices: HC$1.10 MF$0.50
Summer Inst. of Linguistics, Santa Ana, Calif.
THE TRANSLATOR AS A BLACK BOX,
by Joseph E. Grimes. Jul 63, 5p
NSF Scientific Documentation Project.

Descriptors: (*Machine translation, Grammar), (*Grammar, Machine translation), Vocabulary, Data processing systems, Language.

Stored in the memory are two bodies of text in two languages. One corpus is the translation of the other, made by humans or even, perhaps, partly by previous runs of the same system. Each word in one corpus is associated with one, several, or no words in the other; this association is also stored in the machine as cross-reference information. The source language corpus is stored in the form of a concordance, so that when any word in the source language is looked up, the other words that follow each occurrence of it are available at the same time. The document to be translated is looked up word by word, but not in the fashion of a simple dictionary lookup routine. Instead, the object of the lookup is to find the longest possible string of words in the concordance that matches a string in the input text of words that begin with the word being looked up, and which may contain any number of words following that word.

PB-170 422 **Field 5G, 5J, 5K**
CFSTI Prices: HC$1.10 MF$0.50
Illinois Univ., Urbana.
A PILOT STUDY OF CROSS-CULTURAL MEANING,
by Hideya Kumata, and Wilbur Schramm. 1956, 9p
NSF Scientific Documentation Project. Public Opinion Quarterly v20 n1 p229-37 Spring 1956.

Descriptors: (*Culture, Language), (*Social communication, Culture), (*Semantics, Social communication), Perception (Psychology), Word association, Factor analysis.

The study is an exploratory investigation of a limited aspect of the problem of meaning cross-culturally. Such a study was made possible by the development of a measurement tool called the semantic differential. Using this tool with American subjects, it was found that the same three principal factors of meaning recurred when subjects judged various concepts against a sample of bipolar adjectival scales (such as good-bad, strong-weak, etc.) These three factors, labeled evaluation, potency, and activity, seemed to present a description of judgmental dimensions, at least in the area of connotative meaning.

PB-170 491 **Field 5G**
CFSTI Prices: HC$1.10 MF$0.50
Michigan Univ., Ann Arbor.
COMPOUNDING AS A PHONOLOGICAL PROCESS,
by Ilse Lehiste. 1962, 10p
Proceedings of the International Congress of Linguists (9th) p331-7 Cambridge, Mass. 1962.

Descriptors: (*Eastern Europe, Language), (*Phonetics, Eastern Europe), Grammars, Linguistics.

Identifiers: Words, Estonia.

The paper deals with the interrelationships between words as grammatical units and words as intermediate units in the phonological hierarchy. The language from which the illustrations are chosen in Estonian, aFinno-Ugric language. The main phonological characteristic of Estonian is a highly developed quantity system. Segmental phonemes--vowels as well as consonants--appear in three contrastive quantities, short, long, and overlong. Three contrastive syllable types occur, whose quantity is not the sum of the segmental quantities of their constituent phonemes; three degrees of syllabic quantity are established. In Estonian, compounding is a frequently used means to create new words. Two monosyllabic words may be combined to form a disyllabic compound. A comparison of these disyllabic compounds with disyllabic non-compounds reveals several structurally significant differences. (Author)

PB-170 500 **Field 5G, 5J**
CFSTI Prices: HC$1.60 MF$0.50
Research Lab. of Electronics, Mass. Inst. of Tech. Cambridge.
SYNTACTIC STRUCTURES IN THE LANGUAGES OF CHILDREN,
by Paula Menyuk. 1961, 16p
NSF Scientific Documentation Project. Journal of Child Development v34 p417-22 1963.

Descriptors: (*Children, Grammars), (*Grammars, Children), Syntax, English language, Speech, Linguistics, Vocabulary, Learning, Males, Females.

The purpose of this study was to use an explanatory model of grammar, Chomsky's model of syntactic structures, to determine if it was capable of describing a children's grammar as a self-contained system and of indicating developmental trends. Language was elicited and tape recorded in three stimulus situations: (a) spontaneous speech in response to The Blacky Pictures, (b) conversation with an adult (the experimenter), and (c) conversation with peers. For cross validation purposes, the language used in the classrooms of the sample population was transcribed. The language sample of each child and of the classroom groups was analyzed using Chomsky's technique. It was found that the basic structures which generated all the sentences obtained could be described within the framework of the Chomsky model. A children's grammar was written which included all the rules used at both age levels to generate structures consistent with adult usage and those which, presumably, are not. All the basic structures used by adults to generate their sentences were found in the grammar of the nursery school group. In comparing the number of children at the two age levels who used these structures, it was found that most of the structures were used at an early age and used consistently. Structures which were still in the process of being acquired by the nursery school group were also still in the process of being acquired by the first grade group. Structures nonconsistent with adult usage occurred infrequently. Sifnificantly more of the nursery school children omitted rules which are obligatory once a structure has been optionally chosen. There were few significant differences in the usage of all structures between males and females or between children above and below the mean IQ. (Author)

PB-170 492 **See Field 5B**

PB-170 497 **See Field 9B**

5H. MAN-MACHINE RELATIONS

AD-634 213 **Field 5H, 5I**
CFSTI Prices: HC$1.00 MF$0.50
Human Resources Research Office, George Washington Univ., Alexandria, Va.
MEN, MACHINES AND THE SOFTWARE MIDDLEMAN,
by Edgar L. Shriver. Apr 66, 8p Professional paper-3-66
Contract DA-44-188-ARO-2
Prepared for presentation to Symposium Society of Technical Writers and Publishers, Huntsville, Ala., 31 Mar 66.

Descriptors: (*Job analysis, *Professional personnel), (*Man-machine systems, *Maintenance personnel), Maintenance, Documentation, Engineering personnel, Programmed instruction, Symposia.

Identifiers: Technical writing, Technical writers.

This is an invited address given to the Society of Technical Writers at their Huntsville Meeting, April 1966. It is concerned with certain implications of new concepts of electronic maintenance. The author and HumRRO Systems Operations Division, have conducted much of the research on these concepts, but they have been joined in this research area in recent years by other agencies and private industry. These concepts have implications for documentation, programmed instruction and other software areas in which technical writers traditionally are active. The purpose of this address was to draw a picture of how technical writers' jobs might be changed and enlarged if these concepts receive widespread implementation in the future. (Author)

TID-22703 **Field 5H, 5J**
CFSTI Prices: HC$1.00 MF$0.75
American Institutes for Research, Pittsburgh, Pa.
AN EVALUATION OF EXISTING CRITERIA FOR JUDGING THE QUALITY OF SCIENCE EXHIBITS.
Final rept.
by Harris H. Shettel, and Pamela C. Reilly. Nov 65, 80p

Descriptors: (*Public opinion, Test construction (Psychology)), (*Attitudes, Display systems).

For abstract, see T 66 15.

AD-634 251 **See Field 9B**

AD-634 304 **See Field 9B**

AD-634 338 See Field 5I

AD-634 603 See Field 17H

5I. PERSONNEL SELECTION, TRAINING, AND EVALUATION

AD-409 096 Field 5I, 5J
CFSTI Price: HC$5.60
Human Resources Research Office, George Washington Univ., Alexandria, Va.
A PROGRAM OF LEADERSHIP INSTRUCTION FOR JUNIOR OFFICERS.
Technical rept.,
by T. O. Jacobs. Jun 63, 58p TR-84
Contract DA-44-188-ARO-2
Proj. DA-2J024701A712

Descriptors: (*Officer personnel, Military training), (*Military training, Officer personnel), (*Group dynamics, Leadership), (*Leadership, Military psychology), Behavior, Instruction manuals.

A leadership course for junior officers was developed, based on research findings that identified effective and ineffective leader actions and on leadership training methods of demonstrated effectiveness. The course emphasized study of the leader's interactions with his men in the accomplishment of assigned tasks, and the effect of his actions both on the motivation and morale of his men and on the unit's ability to perform assigned tasks. Student reactions to the course immediately after its completion were good. Follow-up data from the final evaluation group indicate that these favorable reactions do not diminish significantly over a period of four months. (Author)

AD-477 647 Field 5I, 19C
CFSTI Prices: HC$2.60 MF$0.50
Human Resources Research Office, George Washington Univ., Alexandria, Va.
THE DEVELOPMENT OF PERFORMANCE CRITERIA FOR TURRET MECHANICS.
Research memo.,
by Jack Mumford, and John P. Smith. Jul 61, 21p
Task 11-23

Descriptors: (*Technicians, Performance (Human)), (*Maintenance personnel, Tanks (Combat vehicles)), Tank turrets, Measurement, Sampling, Standards, Training.

AD-634 221 Field 5I, 5J
CFSTI Prices: HC$2.00 MF$0.50
Hofstra Univ., Hempstead, N. Y.
PRACTICE EFFECTS, KNOWLEDGE OF RESULTS AND TRANSFER IN PITCH DISCRIMINATION.
Technical rept.,
by Walter I. Heimer, and Sherman J. Tatz. Apr 66, 31p
Contract N61339-1337
NAVTRADEVCEN-IH-52
Prepared in cooperation with Post (C. W.) Coll.

Descriptors: (*Pitch discrimination, *Training), Feedback, Noise, Background, Performance tests, Transfer of training.

The effect of practice on the ability of Ss to discriminate differences in pitch between two sounds (difference thresholds or DLs) was investigated using four different experimental groups. These four groups differed in regard to the frequency at which training was given (800 or 3,000 cps), and whether or not knowledge of results was given. All discriminations were made against a white noise background. Training was given to all experimental Ss for four successive days with a fifth day devoted to both practice and a transfer test. The daily procedure consisted of listening to three tapes, each requiring 100 discriminations. A modified descending staircase procedure (method of limits) was utilized in obtaining the difference threshold. The main findings were: (1) a negatively accelerated, declining curve of DLs for all four experimental groups with the largest drop taking place within the first day or two for most Ss, (2) discrimination was slightly better with knowledge of results than without, but not significantly so, and (3) the surprising fact that a net negative transfer of training effect was revealed when the transfer was attempted between the two different points on the frequency spectrum utilized here. Implications for auditory training procedures are discussed. (Author)

AD-634 258 Field 5I, 5A
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
SMALL COMPANY STRATEGY IN MINORITY GROUP EMPLOYMENT,
by Jerry J. Jensen. May 66, 10p P-3387

Descriptors: (*Employment, *Personnel management), Management planning, Commerce, Population, Training, Motivation, Applied psychology.

Identifiers: Negroes.

Once a small company has decided to make special effort in minority group hiring, it will find itself facing somewhat different problems than large companies have. Qualified minority people will be hard to find at just the time openings occur, and ongoing training programs may not be available to develop qualified employees. To meet these special problems, small companies will need a unique approach to recruiting and training. They can capitalize on their size by emphasizing more personal and informal human relationships in their recruiting activity. Then they can upgrade present minority employees through modest training programs built around person-to-person coaching. In spite of sincere attempts to make progress in fair employment, companies may find themselves charged with discriminatory practices. Preparation for this possibility is best made through adequate documentation of employment, promotion and disciplinary actions. Availability of written records will encourage more cooperative attitudes when formal investigation is made into alleged discrimination. Finally, progress in fair employment should be measured by a number of statistical yardsticks, not just by comparison of company minority population with community minority population. (Author)

AD-634 259 Field 5I, 15G
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
THE IMPACT OF MODERN TECHNOLOGY ON THE SOVIET OFFICER COkPS,
by Roman Kolkowicz. Jun 66, 24p P-3380
Prepared for presentation at the World Congress of Sociology (6th), 6 Sep 66, Evian, France.

Descriptors: (*Officer personnel, USSR), (*Armed forces (Foreign), USSR), Automation, Military strategy, Political science, Military organizations.

For abstract, see T 66 15.

AD-634 301 Field 5I, 16A
CFSTI Prices: HC$2.00 MF$0.50
Human Resources Research Office, George Washington Univ., Alexandria, Va.
DEVELOPMENT OF TECHNICAL TRAINING MATERIALS FOR NIKE HERCULES JUNIOR OFFICERS.
Technical rept.,
by Edgar M. Haverland. Jun 66, 46p TR-66-6
Contract DA-44-188-ARO-2
Proj. DA-2J024701A712-01

Descriptors: (*Guided missile personnel, Training), (*Programmed instruction, Checkout procedures), Guided missiles (Surface-to-air), Training devices, Effectiveness, Officer personnel, Learning.

Identifiers: Nike-Hercules.

The checks and procedures necessary to determine whether the major functions of the Nike Hercules fire control system could be satisfactorily accomplished were chosen, and programed instructional materials were written to teach junior officers the relevant technical information. Evaluation of these materials indicated (1) that they taught a substantial amount of technical information additional to that taught in the Officer Basic Course (44-A-C20) at the U.S. Army Air Defense School, and (2) that more technical information was learned from the SAMOFF IV programed instruction than was learned from directed study of existing Army reference material. (Author)

AD-634 314 Field 5I
CFSTI Prices: HC$2.00 MF$0.50
Army Personnel Research Office, Washington, D. C.
RESEARCH ON THE SELECTION OF OFFICER CANDIDATES AND CADETS,
by Leon J. Kotula, and Helen R. Haggerty. May 66, 29p Technical research rept. 1146
Proj. 2J024701A722

Descriptors: (*Officer personnel, Selection), (*Psychometrics, Officer personnel), Aptitude tests, Military psychology, Military requirements, Achievement tests.

Identifiers: Personnel screening tests.

The objective of the CADET LEADERS Task is to develop and refine psychological measures for use in primary officer selection and evaluation programs, specifically in selecting students for the Reserve Officer Training Corps, the Army Officer Candidate Schools, and the U. S. Military Academy. Technical Research Report 1146 describes selection procedures now in effect for each of the programs and states the research basis for the measures used. The report also surveys current research requirements for officer procurement programs recently expanded by Act of Congress, research needed to adapt selection procedures to current OCS training requirements, and special studies for the USMA. Continuing research has resulted in the development, operational implementation, and refinement of tests of mental ability, physical proficiency, and leadership used in selecting cadets and officer candidates. Two new forms of the ROTC Qualifying Examination, RQ-8 and RQ-9, developed to screen students for admittance to the Senior ROTC Division (Military Science III) were implemented in the spring of 1966. A Basic ROTC Examination developed and validated for screening MS I students will be available for operational use in the fall of 1966. Further research will be undertaken to increase the effectiveness of screening and selection programs in conjunction with an intensive study of officer and leadership qualities as they emerge at the USMA and after commissioning. (Author)

AD-634 338 Field 5I, 17H, 5H
CFSTI Prices: HC$3.00 MF$0.75
General Dynamic Corp., Groton, Conn. Electric Boat Div.
COMPUTER BASED ADAPTIVE TRAINING APPLIED TO SYMBOLIC DISPLAYS.
Technical rept.,
by Angelo Mirabella, and Jerry C. Lamb. Mar 66, 62p
Contract N61339-1594
NAVTRADEVCEN-1594-1

Descriptors: (*Training, Display systems), Targets, Detection, Computers, Training devices, Effectiveness.

Identifiers: Target detection.

Three experiments were conducted to explore the effects of adaptive vs. nonadaptive training upon performance in a visual target detection task in-

volving symbolic data displays. The results indicated that increasing display complexity during training and requiring subjects to respond actively to the displays were more effective than maintaining a constant level of complexity and requiring only passive viewing of the displays. But there was no evidence to suggest that changing complexity in an adaptive fashion was more effective than changing complexity in an arbitrary stepwise fashion. Additional findings indicated that maintaining subjects at a high nominal error rate during training was not necessarily detrimental to posttraining performance. A high error rate was at least as effective as a low rate, where the high rate was reached by increasing error rate in a stepwise fashion. (Author)

AD-634 350 **Field 5I, 19E**
CFSTI Prices: HC$1.00 MF$0.50
Naval Personnel Program Support Activity, Washington, D. C. Personnel Research Lab.
MANNING REQUIREMENTS FOR FIRE CONTROL SYSTEMS ASSOCIATED WITH TORPEDO MK 48,
by James S. Carra, and James P. Henry. Jun 66, 18p WRM-66-49

Descriptors: (*Fire control systems, *Operators (Personnel)), Personnel management, Naval personnel, Officer personnel, Technicians, Naval training, Shipborne, Torpedoes.

Identifiers: Mark 101 Fire control systems, Mark 114 Fire control systems, Mark 48 Torpedos.

The memorandum presents estimates of the manning requirements for fire control systems associated with Torpedo MK 48. No increase of billets is required for ships whose fire control system will undergo modification. Officers assigned to the modified fire control systems will receive one week's instruction. Technicians will receive approximately eight week's training in the maintenance of the new components. (Author)

AD-634 510 **Field 5I**
CFSTI Prices: HC$6.00 MF$1.25
Human Resources Research Office, George Washington Univ., Alexandria, Va.
PROCEDURES FOR DERIVING TRAINING OBJECTIVES FOR JUNIOR OFFICERS.
Manual,
by Harry L. Ammerman. Dec 63, 226p
First revision November 1964.

Descriptors: (*Officer personnel, *Army training), Army personnel, Job analysis, Personnel management, Instruction manuals.

The procedures start by taking a comprehensive look at the total job and listing all the job activities. A questionnaire is then used to rapidly obtain extensive judgments about these activities and their currently existing performance requirements. This information is analyzed to narrow the scope of further investigation to just the job activities of most critical training interest. This is followed by the specification of the essential knowledge and skill requirements for the selected job activities.

AD-634 513 **Field 5I, 15G**
CFSTI Prices: HC$12.60 MF$1.00
Human Resources Research Office, George Washington Univ., Alexandria, Va.
CRITICAL COMBAT SKILLS, KNOWLEDGES, AND PERFORMANCES REQUIRED OF THE 1962 LIGHT WEAPONS INFANTRYMAN (MOS 111.0).
Research memo.
Jan 61, 124p

Descriptors: (*Warfare, *Army training), Teaching methods, Military tactics, Weapons, Army personnel, Performance (Human).

Identifiers: Light Weapons Infantryman.

This Research Memorandum reports in Annexes, grouping them according to functional elements, the minimum critical combat skills, knowledges, and performances required of the Light Weapons Infantryman (MOS 111.0) of 1962. The text gives suggestions on how the content can be used currently by agencies of the Army charged with training responsibilities as a basis for: (1) review of Army Training Programs 7-17 and 21-114, (2) review of Army Subject Schedules pertinent to ATP's 7-17 and 21-114, (3) proficiency tests, (4) planning small unit field problems, (5) preparation of lesson plans for ATP 7-17, and (6) a Light Weapons Infantryman's handbook. Although this analysis is directed at 1962, it is considered valid for the period from publication to 1962, for all but a few subjects in which weapons are not available. Validity may run into the 1962-65 period, depending upon availability and development of new weapons. (Author)

AD-634 595 **Field 5I, 5J**
CFSTI Prices: HC$1.00 MF$0.50
Naval Personnel Program Support Activity, Washington, D. C. Personnel Research Lab.
DEVELOPMENT OF THE SHORT BASIC TEST BATTERY FORM SB-3.
Final rept.,
by Aaron Katz, and Paul J. Barnes. Jun 66, 22p
WTB-66-3
Proj. PF016040302
See also AD-603 238.

Descriptors: (*Naval personnel, Selection), (*Test construction (Psychology), Personnel management), Psychometrics, Correlation techniques, Mechanics, Small tools, Mathematics.

The report describes the development of an alternate form (Form SB-3) to the current Forms SB-1 and -2 of the Short Basic Test Battery (SBTB), in which the tests are one-half to two-thirds the length of those in the current form of the Basic Test Battery (BTB). The method used in developing norms and the results of correlational analysis ensure that the newly-developed tests in Form SB-3 of the SBTB are sufficiently reliable and predictive of the scores of enlisted applicants on the corresponding tests of the BTB itself. The results further indicated that Form SB-3 tests are sufficiently equivalent to their Forms SB-1 and -2 counterparts in these and other essentials to warrant use of the three SBTB forms, if desired, as interchangeable instruments in the preliminary classification of enlisted applicants. (Author)

AD-634 610 **Field 5I**
CFSTI Prices: HC$1.00 MF$0.50
Naval Aerospace Medical Inst., Pensacola, Fla.
THE RELATIONSHIP OF COLLEGE MAJOR TO SUCCESS IN NAVAL AVIATION TRAINING,
by Floyd E. Peterson, and Norman E. Lane. 22 Apr 66, 16p NAMI-958
NAVMED-MF022.01.02-5001.47

Descriptors: (*Naval training, Effectiveness), (*Aviation personnel, Naval training), Universities, Education, Background, Selection, Psychometrics, Correlation techniques.

College major of flight students was investigated as a possible predictor of success in naval aviation training. Each of 1245 pilot trainees was placed into one of ten categories according to his college major. Three dichotomous criteria of success/failure were used. The extent to which the inclusion of college major categories contributed to the multiple prediction of success in flight training was examined by the Wherry-Doolittle technique. Their contribution was determined both as primary selection variables and as predictors after the completion of academic training. The inclusion of college major categories both as primary and as secondary selection variables significantly increased the multiple prediction of success/failure in naval aviation training. (Author)

N66-14419 **Field 5I**
CFSTI Prices: HC$4.00 MF$1.00
Stanford Univ., Calif. School of Engineering.
A STUDY OF THE UNIVERSITY ROLE IN ENGINEERING RESEARCH FOR NASA PARTICULARIZED TO THE STANFORD UNIVERSITY CASE.
Final rept.
25 Jun 65, 136p
Contract NGR-05-020-069
NASA-CR-68968

Descriptors: *Engineering (Gen), *NASA program, *University program.

For abstract, see T 66 15.

PB-169 042 **Field 5I**
CFSTI Prices: HC$2.00 MF$0.50
System Development Corp., Santa Monica, Calif.
NON-PROGRAM VARIABLES IN THE APPLICATION OF PROGRAMMED INSTRUCTION.
Final rept.,
by John E. Coulson, Ralph J. Melaragno, and Harry F. Silberman. 21 Jul 65, 37p Technical memo. TM-2176/201/00
Grant OE-7-14-9120-249

Descriptors: (*Programmed instruction, Effectiveness), (*Learning, Programmed instruction), Teaching methods, Instructors, Students, Motivation.

Recent research suggests that programmed instruction is far from the self-contained self-sufficient instructional vehicle it is often assumed to be. The effectiveness of even the most carefully prepared program is largely governed by factors external to the program itself, such as the way in which the program is applied by the teacher and the degree of control the student has over the program. The purpose of this experiment was to analyze the specific factors, operating in conjunction with but external to the program itself, that contribute most significantly to student learning. The major hypotheses of the study were: (1) learning is increased when an experimenter (teacher) actively arguments the program by rephrasing program statements and by branching the student to different parts of the program when the student has difficulty with a particular topic, (2) learning is increased when the experimenter has access to detailed displays of current and past student performance, designed to assist him in diagnosing student learning problems, (3) learning is increased by allowing the student to branch voluntarily in the program at any time during the instruction. Data from both experiments indicated that the teachers were not able to contribute to learning in the programmed learning situation. Student control over the program was not exercised, and therefore had no change to influence learning. Possibly in future studies the students could be motivated to review by allowing them to ask questions in their natural language, or by using preprogrammed remedial loops as 'penalties' for students who advance before they have thoroughly mastered each topic. (Author)

PB-169 872 **Field 5I, 5J**
CFSTI Pri. es: HC$1.60 MF$0.50
Civil Aeromedical Research Inst., Oklahoma City, Okla.
PROBLEMS IN AIR TRAFFIC MANAGEMENT: VII. JOB AND TRAINING PERFORMANCE OF AIR TRAFFIC CONTROL SPECIALISTS, MEASUREMENT, STRUCTURE, AND PREDICTION,
by David K. Trites, M. Clinton Miller, and Bart B. Cobb Jul 65, 15p
AM-65-22
Prepared in cooperation with Oklahoma Univ., Oklahoma City. Medical Center, Contract FA-AC-4-730, See also AD-620 721.

Descriptors: (*Air traffic controllers, Psychometrics), (*Personnel management, Air traffic controllers), Job analysis, Training, Instructors, Aptitude tests, Performance (Human), Emotions.

A statistical study of training and job-performance measures of several hundred Air Traffic Control Specialists (ATCS) representing Enroute, Terminal, and Flight Service Station specialties revealed that training-performance measures reflected: (1) performance in the training laboratories; (2) academic performance; and (3) instructors' opinions. In the job-performance area, supervisors seemed to be evaluating (1) overall performance of an ATCS; (2) his interpersonal orientation; (3) job orientation; (4) job potential; (5) job performance; and (6) emotional stability. By examining the practicability of the job-performance measures by training performance, aptitude tests, previous job-releyant experience, and demographic characteristics, evidence was elicited that: (1) the ATCS specialties differ in the characteristics required for job performance; (2) Terminal supervisors more consistently evaluate their ATCS in comparison with Enroute supervisors; (3) opinions of the ATCS training-course instructors are the best predictors of subsequent job performance; and (4) aptitude tests, previous job-relevant experience, and age at entry into training are related to job performance but not at very high levels. (Author)

PB-170 495 **Field 5I, 9B**
CFSTI Prices: HC$1.10 MF$0.50
Birbeck Coll., London (England).
ADAPTIVE TEACHING MACHINES,
by B. N. Lewis. 1963, 5p
Reprinted from Nature v196 n4861 p1276-7 Dec 29 1962.

Descriptors: (*Teaching machines, Adaptive systems), Learning, Students, Training, Great Britain.

An adaptive teaching machine is a machine that modifies its training programme to suit the student's individual requirements. The adaptive teaching machine presents a sequence of instructional items on some suitably automated display, and a sequence of test items for establishing whether or not the instruction has been understood. Test items usually consist of questions to which the student must respond by pressing, within a given time allowance, an appropriate button or key. The SAKI (Solatron Automatic Keyboard Instructor) device consists of a display unit that gives instructions and prompts, a keyboard which the trainee must operate (without looking at the keys), and an adaptive computer which 'senses' the characteristics of the student and adjusts the training programme to suit his needs. The display unit consists of a back-lighted exercise card (containing four lines of 24 figures) and an array of 12 lights laid out in the same spatial pattern as the 12 keys on the keyboard. Since some combination of figures are harder to punch than others, the exercise cards are changeable and are graded with respect to difficulty.

PB-170 502 **Field 5I**
CFSTI Prices: HC$1.10 MF$0.50
Michigan Univ., Ann Arbor.
TEACHING MACHINES AND PROGRAMMED LEARNING,
by Harlan Lane. 1960, 8p
Prepared in cooperation with Harvard Univ., Boston, Mass. Harvard Educational Review v31 n4 p469-76 1961. NSF Scientific Documentation Project.

Descriptors: (*Teaching machines, Programmed instruction), (*Programmed instruction, Teaching machines), Education, Learning, Teaching methods, Verbal behavior, Humans, Behavior, Test methods, Effectiveness, Reviews.

AD-477 645 **See Field 19F**

AD-634 213 **See Field 5H**

AD-634 406 **See Field 6S**

AD-634 593 **See Field 9B**

AD-634 612 **See Field 6N**

PB-169 870 **See Field 6N**

PB-170 052 **See Field 5C**

5J. PSYCHOLOGY (INDIVIDUAL AND GROUP BEHAVIOR)

AD-634 174 **Field 5J**
State Univ. of New York, Buffalo.
VALIDITY OF PEER NOMINATIONS IN PREDICTING A DISTANT PERFORMANCE CRITERION.
by E. P. Hollander. 20 Aug 64, 5p
Contracts Nonr-760 (06), Nonr-816 (12)

Descriptors: (*Performance (Human), Public opinion), (*Group dynamics, Decision making), Office personnel, Students, Psychometrics.

The paper reports the follow-up phase of a study of peer nominations begun in 1955 at the Naval OCS in Newport, Rhode Island. Over 700 trainees completed several peer nomination forms at various stages of training, 1 in particular on 'success as a future Naval Officer' (FO). Subsequently, 639 trainees were identified who had gone on to duty as officers for about 3 yrs. The average grade they secured on a key portion of the fitness report ratings assigned by their direct superior officers was used as a performance criterion; it had a split-half reliability of .90. In the prediction of this criterion, the FO peer nomination score from the 3rd week of training gave a validity of .40 which was as high as that for later FO scores and which was only slightly diminished after academic grades and popularity were partialed. The findings support the use of early peer nominations as a valid supplemental measure in predicting performance after training. (Author)

AD-634 542 **Field 5J**
CFSTI Prices: HC$2.00 MF$0.50
Swarthmore Coll., Pa. Dept. of Psychology.
EFFECT OF LEARNING ON THE VISUAL PERCEPTION OF DEPTH.
Technical rept.,
by Hans Wallach. Aug 62, 35p
Contract N61339-511
NAVTRADEVCEN-511-1

Descriptors: (*Space perception, *Learning), Transfer of training, Vision, Retina.

An investigation was made to explore the nature of learning, transfer, and forgetting in the visual perception of depth. Numerous preliminary experiments were conducted in order to find a situation in which the occurrence of perceptual learning could be convincingly demonstrated and cogently studied. The experiments that were finally selected for major emphasis dealt with stereoscopic depth perception (retinal disparity), and the kinetic depth effect, i. e., the cues that are due to rotation of a three-dimensional object or the observer's locomotion around the object.

PB-169 179 **Field 5J**
CFSTI Prices: HC$1.00 MF$0.50
Harvard Univ., Cambridge, Mass. Lab. of Psychophysics.
PROGRESS REPORT 45, 1 JULY-31 DECEMBER 1965.
31 Dec 65, 21p
Grants NSF-GB-3211, PHS-B-2974

Descriptors: (*Sensory perception, Scientific research), Sound, Hearing, Auditory perception, Thresholds (Physiology), Skin, Muscles, Taste, Programming (Computers), Retina, Visual perception, Brightness, Children, Stimulation, Psychophysiology, Psychometrics.

CONTENTS: Sound and Hearing; Temperature coefficients of the electrical thresholds of taste sensations; A metric for the social consensus; Taste theories and the chemical stimulation of single papillae; Transfer functions of the skin and muscle senses; A computer program to fit a straight line when both variables are subject to error; Matching functions between loudness and ten other continua; On- and offset balances; Power-group transformations under glare, masking, and recruitment; Scaling of saturation and hue; Brightness as a function of retinal locus; Brightness estimation and target size; The shape of the loudness function near threshold; The brightness of flickering lights; Individual magnitude estimation functions for shock; Psychophysical judgments by children; How loudness depends on the intensity and duration of the stimulus; The relation between bisection and magnitude scales.

AD-272 647 **See Field 17H**

AD-279 464 **See Field 5D**

AD-409 096 **See Field 5I**

AD-634 221 **See Field 5I**

AD-634 344 **See Field 6P**

AD-634 375 **See Field 12B**

AD-634 457 **See Field 6J**

AD-634 483 **See Field 6D**

AD-634 595 **See Field 5I**

PB-169 219 **See Field 17H**

PB-169 442 **See Field 6E**

PB-169 872 **See Field 5I**

PB-170 422 **See Field 5G**

PB-170 497 **See Field 9B**

PB-170 500 **See Field 5G**

TID-22703 **See Field 5H**

5K. SOCIOLOGY

PB-170 422 **See Field 5G**

6A. BIOCHEMISTRY

AD-634 320 **Field 6A**
CFSTI Prices: HC$1.00 MF$0.50
Army Foreign Science and Technology Center, Washington, D. C.
CONCERNING SOME ELEMENTS OF CHLORELLA PROTEIN STRUCTURE,
by N. N. Melteva, L. I. Polotnova, N. I. Tikhomirova, and A. A. Freiman. Jun 66, 9p FSTC-HT-23-109-66
TT-66-61506
Trans. of Izvestiya Vysshikh Uchebnykh Zavedenii Pishchevaya Tekhnologiya (USSR) n2226 p45-8 1965.

Descriptors: (*Chlorella, Proteins), (*Proteins, Molecular structure), Algae, Amino acids, Chromatographic analysis, Spectroscopy, Solvents, Glutamic acid, Methionine, Aspartic acid, Tyrosine, USSR.

Identifiers: Arginine, Lysines.

Treatment of lyophil-dried specimens of chlorella with dichlormethane freed them of the impurities which cause swelling in water solutions. The protein separated from chlorella, regardless of the form of solvent, contains the same N-terminated groups (glutamic acid, methionine and a small quantity of aspartic acid) and C-terminated groups - (tyrosine and arginine). In chlorella, the amount

of proteins containing lysine with free amino group is less than the amount of lysine determined after complete hydrolysis of the protein. It is assumed that a portion of the lysine contained in the protein of the chlorella is assimilable. (Author)

AD-634 537 **Field 6A**
CFSTI Prices: HC$4.00 MF$0.75
Maryland Univ., College Park. Inst. for Fluid Dynamics and Applied Mathematics.
MIGRATION AND TRAPPING OF EXCITATION QUANTA IN PHOTOSYNTHETIC UNITS.
Doctoral thesis,
by Robert M. Pearlstein. Jun 66, 110p BN-453
Contract Nonr-595 (22), Grant NsG-398

Descriptors: (*Photosynthesis, Excitation), Transport properties, Relaxation time, Diffusion, Quantum mechanics, Chlorophylls.

Identifiers: Theses.

The migration and trapping of excitation quanta in photosynthetic units are treated as a problem of the transport of localized excitons through molecular networks. One, two, and three dimensional networks are treated as distinct cases. For the most part, attention is restricted to regular lattices, and all but nearest neighbor interactions are neglected. The latter are characterized by a single rate constant for ordinary pairs of molecules in the network, and by a possibly distinct rate between an ordinary molecule and a trapping center, or trap. It is pointed out that results for those finite networks explicitly considered apply also to infinite systems with periodic traps.

AD-634 549 **Field 6A, 6M**
California State Coll., Los Angeles. Dept. of Microbiology.
ISOLATION OF A LOW MOLECULAR WEIGHT SIALIDASE (NEURAMINIDASE) FROM INFLUENZA VIRUS,
by J. T. Seto, R. Drzeniek, and R. Rott. 4 Nov 65, 4p
Contract Nonr-3723 (00)
Proj. NR-103-527

Descriptors: (*Influenza virus, *Hydrolases), (*Viruses, *Enzymes), Separation, Purification, Molecular weight.

Identifiers: Sialidase.

A procedure is described for the isolation and partial purification of sialidase from influenza virus. Sedimentation coefficient analyses of the enzyme suggest that it is of relatively low molecular weight with a coefficient of 8.8S.

AD-634 653 **Field 6A, 6O, 15B**
CFSTI Prices: HC$1.00 MF$0.50
Edgewood Arsenal, Md. Chemical Research Lab.
THE ENZYMIC TRANSFORMATION OF SECONDARY NITROGEN MUSTARDS: IMPLICATIONS IN RESPIRATION,
by Charles E. Williamson, James G. Kirby, Samuel Sass, and Benjamin Witten. Jun 66, 19p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Nitrogen mustards, *Respiration), (*Blood, Nitrogen mustards), (*Enzymes, Blood), Amines, Chemical reactions, Reaction kinetics, Carbonates, Transformations, Carbamic acids.

Identifiers: Bis(chloroethyl)amines.

An examination was made of the nature of the reaction between the secondary nitrogen mustard, N,N-bis (2-chloroethyl)amine (nor-HN2), and blood; and of the mechanism of the transformation of nor-HN2 in aqueous bicarbonate and blood. A previously unreported enzyme was found in human and animal blood that catalyzes carbamate formation.

N66-15245 **Field 6A**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
INCORPORATION OF PROTEIN AND NUCLEIC ACID PRECURSORS INTO FROG NERVOUS TISSUE IN VITRO,
by P. C. F. Castellani, J. O. Coleman, and J. Shapira. 1964, 14p NASA-TM-X-54943

Descriptors: *Frog, *Peripheral nervous system, *Central nervous system, *Nucleic acid, *Radioactive nuclide.

For abstract, see T 66 15.

N66-15776 **Field 6A**
CFSTI Prices: HC$3.00 MF$0.75
Aeronutronic Div. Philco Corp., Newport Beach, Calif.
EXPERIMENTAL STUDIES FOR THE DETECTION OF PROTEIN IN TRACE AMOUNTS.
Final rept.
by E. R. Walwick, and B. R. Zalite. 28 Jan 66, 90p V-3427
Contract NASw-770
NASA-CR-69551

Descriptors: *Dye, *Macromolecule, *Detection, *Protein.

PB-169 208 **Field 6A, 6P**
CFSTI Prices: HC$3.00 MF$0.75
Biological Sciences Communication Project, George Washington Univ., Washington, D. C.
SERIALS RELATING TO BIOCHEMISTRY AND ENDOCRINOLOGY: THEIR IDENTIFICATION AND AN ANALYSIS OF THEIR CHARACTERISTICS,
by Charles W. Shillings, and Mildred Benton. Jul 65, 68p BSCP-21-65
Grant PHS-GM-11711-02

Descriptors: (*Biochemistry, Periodicals), (*Endocrine glands, Periodicals).

PB-169 808 **Field 6A**
CFSTI Price: HC$61.20
Army Medical Research and Nutrition Lab., Denver, Colo.
BIOCHEMICAL AND DIETARY PROCEDURES. FOR USE IN THE STUDY OF METABOLIC FUNCTIONS AND FOR THE EVALUATION OF NUTRITIONAL STATUS,
by C. Frank Consolazio, and Robert E. Johnson. 29 Jan 60, 616p Rept. no. 242
Proj. 6X60-09-001
AD235 768
Prepared in cooperation with Illinois Univ., Urbana.

Descriptors: (*Nutrition, Biochemistry), (*Diet, Metabolism), Enzymes, Vitamins, Hemoglobin, pH, Minerals, Fats, Carbohydrates, Proteins, Hormones, Blood, Chemical analysis, Medical equipment, Medical laboratories.

A collection of biochemical and dietary procedures are presented that have been used for studying the various aspects of metabolic functions and for evaluating the nutritional status of civilian and military populations throughout the world. It also includes sections on statistical analysis, interpretation of clinical signs and symptoms of nutritional deficiencies, and clinical laboratory procedures. (Author)

UCRL-16492 **Field 6A, 6C, 7C**
CFSTI Prices: HC$3.00 MF$0.75
Lawrence Radiation Lab., Univ. of California, Berkeley.
QUANTUM CONVERSION IN PHOTOSYNTHENANCE INVESTIGATIONS,
by R. H. Ruby. Jan 66, 60p
Contract W-7405-eng-48

Descriptors: (*Photosynthesis, Paramagnetic resonance), (*Plants (Botany), Biochemistry).

For abstract, see N 20 13.

AD-467 436 **See Field 15B**

AD-634 347 **See Field 6H**

AD-634 574 **See Field 6E**

AD-634 636 **See Field 6P**

BNL-931 **See Field 6C**

6B. BIOENGINEERING

AD-634 187 **Field 6B, 20K, 6D**
CFSTI Prices: HC$2.00 MF$0.50
Sensory Systems Lab., Tucson, Ariz.
STUDY AND DEVELOPMENT OF MUSCLE SUBSTITUTES.
Final technical rept.,
by Howard A. Baldwin, Ernest L. Morrison Jr, and Ronald L. Brown. May 66, 48p
Contract AF33 (615)-1232
AFAL-TR-66-139

Descriptors: (*Mechanical engineering, *Bionics), Electric power production, Engines + motors, Generators, Muscles, Contraction, Peristalsis, Control systems, Functions, Gain, Pulse amplifiers, Biophysics, Computers, Fluid dynamics, Pumps, Models (Simulations), Partial differential equations, Pneumatic devices, Mechanical drawings, Experimental data.

Identifiers: Biomechanics, Electromyography, Bioengineering.

The investigations in the current program concern the application of the low pressure contractive 'muscle-like' devices to electrical power generation, peristaltic pump action, and a single function electromyograph control system. Design studies indicate typical operational characteristics for the cited device applications. Predicted pump and generator power transfer efficiencies indicate no direct advantages when compared to current systems. Areas of utility for the contractive devices in limited control functions are indicated. (Author)

LA-3440 **Field 6B, 9B**
CFSTI Prices: HC$3.00 MF$0.50
Los Alamos Scientific Lab., Univ. of California, N. Mex.
COMPUTER ANALYSIS OF CELL VOLUME DISTRIBUTION,
by Phillip N. Dean. Nov 65, 51p
Contract W-7405-eng-36

Descriptors: (*Blood volume, Programming (Computers)), (*Programming (Computers), Hematology).

For abstract, see T 66 15.

6C. BIOLOGY

AD-430 655 **Field 6C, 6S**
CFSTI Price: HC$2.60
Aeromedical Research Lab. (657st), Holloman AFB, N. Mex.
CHIMPANZEE PERFORMANCE DURING EIGHT DAYS OF SIMULATED ORBITAL FLIGHT,
by Herbert H. Reynolds, Gregg A. Gilbert, Victor Bogo, and Gary T. Barnhart. Feb 64, 29p ARL-TDR-64-2
Proj. AF-6893
Tasks 689301, 689302

Descriptors: (*Space flight, Simulation), (*Performance tests, Space flight), Primates, Space medicine, Analysis of variance, Life support, Job analysis, Monitors, Vision, Hearing, Sensory mechanisms, Touch, Stimulation, Reaction (Psychology), Psychomotor tests.

This report describes the performance of a chimpanzee in a 5 psi, 91 to 95% oxygen live cell environment over an 8-day period. Although reaction times on three different tasks were not of the quality of pre-experimental data, they were well below the allowable time interval for responding. Another task, involving continuous motor functioning, was essentially unaffected. The fifth task provided food or water reinforcement for a given amount of work, but previous hunger and thirst motivational levels were altered by approximately 50% over the 8 days of testing. However, the subject lost less than 1 pound of weight during the test and his post-experimental condition was good. (Author)

AD-634 125 **Field 6C**
CFSTI Prices: HC$5.00 MF$1.00
Tokyo Medical and Dental Univ. (Japan). Dept. of Medical Zoology.
ILLUSTRATED KEYS TO ADULT FILTH FLIES OF JAPAN,
by Rokuro Kano, and Satoshi Shinonaga. 1966, 175p
Contracts DA-92-557-FEC-36822, DA-92-557-FEC-37476
Addendum to AD-634 124.

Descriptors: (*Diptera, Morphology (Biology)), Disease vectors, Adults, Muscidae, Males, Females, Military medicine, Japan.

Identifiers: Calliphoridae.

For abstract, see T 66 15.

AD-634 152 **Field 6C, 6M, 6E**
CFSTI Prices: HC$3.00 MF$0.75
Albany Medical Coll., N. Y. Inst. of Experimental Pathology and Toxicology.
STUDY OF THE VIRAL FLORA OF THE ALIMENTARY TRACT OF CHIMPANZEES.
Final rept., 1 Mar 64-31 Dec 65,
by Frederick Coulston, and Kenneth B. Soike.
Apr 66, 89p
Contract AF 29 (600)-4564
Proj. AF-6892
ARL-TR-66-10

Descriptors: (*Chimpanzees, *Viruses), Digestive system, Throat, Excretion, Medical examination, Identification, Adenoviruses, Enteroviruses, Coxsackie virus, Parainfluenza virus, Serodiagnosis, Antigens + antibodies.

Identifiers: Feces, Reoviruses.

Throat and fecal specimens have been taken from approximately 40 chimpanzees on each of six occasions over a period of 18 months at 3 month intervals and studies for the presence of viruses. Ninety-six chimpanzees have been examined one or more times in this survey. Sixty-nine viral isolates have been recovered from 502 throat and fecal specimens. Forty viruses have been classified as enteroviruses, presumably belonging to the group of enteric cytopathogenic orphan viruses. Nine adenoviruses have been recovered as well as six members of the reovirus group. Five Coxsackie group A viruses were discovered in feces from one collection period. Five viral isolates classified as parainfluenza Type 2 viruses were identified serologically as being related or identical to SV-5 and the existence of the infection by these viruses of the chimpanzee has been demonstrated by the presence of antibody in the homologous chimpanzee sera. Four viruses recovered are presently unclassified. (Author)

AD-634 279 **Field 6C**
CFSTI Prices: HC$1.00 MF$0.50
Maryland Univ., College Park. Dept. of Zoology.
CURRENT REFERENCES IN MEDICAL ENTOMOLOGY FROM RUSSIAN, CENTRAL AND EASTERN EUROPEAN AND CHINESE LITERATURE. VOLUME V, NUMBER 4,
by George Anastos. 1966, 14p
Contract DA-49-193-MD-2238
See also AD-634 355.

Descriptors: (*Disease vectors, Indexes), (*Insects, Disease vectors), Ticks, Mites, Siphonaptera, Diptera, Lice, Hemiptera, Arthropods, Insect control, Insecticides, Pest control, Virus diseases, Protozoa, Rickettsia, USSR, Eastern Europe, China.

For abstract, see T 66 15.

AD-634 280 **Field 6C**
CFSTI Prices: HC$1.00 MF$0.50
Maryland Univ., College Park. Dept. of Zoology.
CURRENT REFERENCES IN MEDICAL ENTOMOLOGY FROM RUSSIAN, CENTRAL AND EASTERN EUROPEAN AND CHINESE LITERATURE. VOLUME NO. V, NUMBER 5,
by George Anastos. 1966, 12p
Contract DA-49-193-MD-2238
See also AD-634 279.

Descriptors: (*Disease vectors, Indexes), (*Insects, Disease vectors), Ticks, Mites, Siphonaptera, Diptera, Hemiptera, Arthropods, Insect control, Insecticides, Pesticides, Virus diseases, Rickettsia, Protozoa, Bacteria, Spirochaeta, USSR, Eastern Europe, China.

For abstract, see T 66 15.

AD-634 355 **Field 6C**
CFSTI Prices: HC$1.00 MF$0.50
Maryland Univ., College Park. Dept. of Zoology.
CURRENT REFERENCES IN MEDICAL ENTOMOLOGY FROM RUSSIAN, CENTRAL AND EASTERN EUROPEAN AND CHINESE LITERATURE. VOLUME V, NUMBER 3,
by George Anastos. 1966, 12p
Contract DA-49-193-MD-2238
See also AD-629 374.

Descriptors: (*Disease vectors, Indexes), (*Insects, Disease vectors), Ticks, Diptera, Mites, Siphonaptera, Arthropods, Bacteria, Spirochaeta, Rickettsia, Virus diseases, USSR, Eastern Europe, China.

For abstract, see T 66 15.

AD-634 683 **Field 6C, 6E**
CFSTI Prices: HC$1.00 MF$0.50
Walter Reed Army Medical Center, Washington, D. C.
ANOPHELES VECTORS OF MALARIA IN SOUTHEAST ASIA,
by Douglas J. Gould, John E. Scanlon, and Ronald A. Ward Jun 66, 13p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Anopheles, Southeast Asia), (*Disease vectors, Hemosporidia), Ecology, Life cycle, Diseases, Plasmodium, Antimalarials, Resistance (Biological), Bites + stings, Tropical regions, Military medicine, Infections, Monkeys, Humans, Primates, Vietnam, Thailand.

The detection of strains of Plasmodium falciparum in SE Asia which are resistant to chloroquine and other synthetic antimalarial drugs has intensified research on all phases of malaria, including study of the Anopheles fauna of the area. In late 1965 the U. S. Army experienced a severe outbreak of malaria among troops operating in forested areas of Vietnam which were very similar to jungle habitats which have been investigated by entomologists of the U. S. Medical Research and Development Command in neighboring Thailand since 1963. In the latter areas, and presumably in much of Vietnam, Anopheles minimus and A. balabacensis are the most important vectors. The latter species is a particularly effective malaria vector in forested areas in much of SE Asia, but its habits were poorly known until recently. It is highly anthropophilic and bites freely in the jungle. Almost all of the personnel engaged in the investigations in Thailand contracted falciparum malaria despite prophylactic drugs and other protective measures. (Author)

AD-634 716 **Field 6C**
CFSTI Prices: HC$1.60 MF$0.50
School of Aviation Medicine, Randolph AFB, Tex.
REPEATED MEASUREMENT DESIGNS, ASSUMING EQUAL VARIANCES AND COVARIANCES,
by Harry M. Hughes, and M. B. Danford. Dec 58, 20p Rept. no. 59-40

Descriptors: (*Biometry, *Experimental design), Analysis of variance, Model theory, Distribution theory, Matrix algebra.

It is shown that if equal variances and covariances are assumed for a repeated measurement design, the commonly used tests of significance are appropriate. (Author)

BNL-931 **Field 6C, 6A**
CFSTI Prices: HC$3.00 MF$1.50
Brookhaven National Lab., Upton, N. Y.
GENETIC CONTROL OF DIFFERENTIATION. REPORT OF SYMPOSIUM HELD JUNE 7-9, 1965. BROOKHAVEN SYMPOSIA IN BIOLOGY, NUMBER 18.
1965, 275p CONF-650665
Contract AT (30-2)-GEN-16

Descriptors: (*Genetics, Symposia), (*Biochemistry, GEenetics).

For abstract, see T 66 15.

NYO-3396-3 **Field 6C, 7E**
CFSTI Prices: HC$2.00 MF$0.50
American Museum of Natural History, New York.
A NEW APPROACH TO NUTRITION, PHYSIOLOGY AND MINERAL CYCLING OF FORAMINIFERA.
Progress rept., 1 May 64-30 Jan 65,
by John J. Lee. 30 Jan 65, 28p
Contract AT (30-1)-3396

Descriptors: (*Foraminifera, Biology), (*Tracer studies, Foraminifera).

N66-14340 **Field 6C**
CFSTI Prices: HC$2.00 MF$0.50
School of Aerospace Medicine, Brooks AFB, Tex.
EXPERIMENTAL ANIMAL DECOMPRESSIONS TO A NEAR-VACUUM ENVIRONMENT. EXPERIMENTAL ANIMAL DECOMPRESSIONS TO LESS THAN 2 MM. HG ABSOLUTE (PATHOLOGIC EFFECTS),
by R. W. Bancroft, and J. E. Dunn II Jun 65, 27p
SAM-TR-65-48
Contract NASA Order DPR T-16758G
NASA-CR-68987
Presented at the Aerospace Med. Assoc. Meeting, Miami Beach, Fla., 12 May 1964.

Descriptors: Atelectasis, Consciousness, *Decompression, Edema, Examination, Hemorrhage, Lung, Oxygen, *Survival, Tissue, *Collapse, Damage, *Dog, Environment, Experiment, *High vacuum, Nitrogen, *Pathology, Time.

PB-169 408 Field 6C, 22A
CFSTI Prices: HC$2.00 MF$0.50
Biological Sciences Communication Project, George Washington Univ., Washington, D. C.
SCIENTIFIC PUBLICATIONS OF THE EXOBIOLOGY PROGRAM, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION,
by Frances Hong, and Freeman H. Quimby. Feb 66, 50p

Descriptors: (*Space biology, Bibliographies), Astronautics, Microorganisms, Life support, Biochemistry, Space medicine, Extraterrestrial topography, Mars (Planet), Venus (Planet), Moon, Soils, Meteors, Mass spectroscopy, Space flight, Planetary atmospheres.

AD-634 124 See Field 6E

AD-634 283 See Field 6D

AD-634 289 See Field 6D

AD-634 294 See Field 6D

ORO-635 See Field 6R

PB-169 384 See Field 13B

PB-169 558 See Field 5B

UCRL-16492 See Field 6A

UH-235P5-1 See Field 18B

6D. BIONICS

AD-634 283 Field 6D, 6C, 12A
CFSTI Prices: HC$1.00 MF$0.50
Chicago Univ., Ill.
INVESTIGATIONS IN THE FIELD OF RELATED BIOLOGY.
Final rept. 1 Oct 63-31 Mar 65,
by Robert Rosen. 31 Mar 65, 6p
Grant AF-AFOSR-9-64
Proj. AF-9777
Task 977701
AFOSR-66-0956

Descriptors: (*Biophysics, Mathematical models), (*Bionics, Optimization), Biology, Metabolism, Genetics, Theory, Adaptation (Physiology), Automatic, Mapping (Transformations).

Identifiers: Sequential machines.

The studies are concerned with the structure and properties of a class of relational models of simple organisms. Some important problems relating to the behavior of these systems in altering environments are related to the properties of associated sequential machines and thence to control problems in dynamical systems. Questions of realizability of these abstract systems are considered in some detail, and the formulation of a general optimality principle, which would allow us to relate the abstract model to specific physico-chemical realizations (i.e., real organisms) is discussed. Some implications of this study, both for important problems in biology, and for the study of nonbiological (i.e., engineering or extraterrestrial) realizations of biological organizations are described. (Author)

AD-634 289 Field 6D, 6P, 6C, 9B K
CFSTI Prices: HC$4.00 MF$0.75
California Univ., Los Angeles. Dept. of Engineering.
DIGITAL COMPUTER SIMULATION OF A SIMPLIFIED NERVE NET,
by Shiang Fan Liu. May 66, 117p Rept. no. 66-30
Contracts Nonr-233 (52), AT (11-1)-Gen-10
Research supported in part by NSF and PHS.

Descriptors: (*Nervous system, Simulation), (*Bionics, Digital computers), Cybernetics, Nerves, Nerve cells, Neuromuscular transmission, Invertebrates.

A neural model of a diffuse, randomly connected two-dimensional network based on the anatomical and physiological evidence of coelenterate nerve nets was constructed and simulated on a digital computer. An experimental on-line nerve net simulation system equipped with a CRT display unit and on-line input keyboards was developed, so that the response of the simulated net could be directly observed and human judgment used during the computation. The response of the model to different input parameters was investigated and the factors which affect the spread of excitation were evaluated. The results of the experiments performed showed that (1) the proportion of transmissive junctions of the net is the dominant factor in determining the characteristics of the response; (2) the length of the advancing front of the excitation spread is one of the factors which influence the distance of spread; (3) three types of excitation spread following repetitive stimulation exist, namely, spread in decreasing distance increments, spread in equal distance increments, and spread in increasing distance increments. The last type of spread is not very well confirmed due to the small size of the net. (Author)

AD-634 294 Field 6D, 6C, 12A
CFSTI Prices: HC$1.00 MF$0.50
Chicago Univ., Ill.
INVESTIGATIONS IN THE FIELD OF RELATIONAL BIOLOGY.
Final rept., 1 Apr 65-31 Mar 66,
by Robert Rosen. 31 May 66, 4p
Grant AF-AFOSR-9-65
Proj. AF-9777
Task 977701
AFOSR-66-1091

Descriptors: (*Bionics, Optimization), (*Biology, *Set theory), Genetics, Automata, Mapping (Transformations), Mathematical models, Reviews.

Identifiers: Sequential machines.

A review is given of work on: metabolic models called (M,R)-systems; relational biology; the effect of environment on the 'metabolic' structre of (M,R)-systems; re-establishability of 'metabolic' components of the system; dynamical systems; and the mathematical 'naturality' of the concept of (M,R)-system.

AD-634 483 Field 6D, 5J, 9B
CFSTI Prices: HC$2.00 MF$0.50
Western Management Science Inst., Univ. of California, Los Angeles.
UTILIZATION OF MEMORY IN CONCEPT LEARNING SYSTEMS,
by Earl Hunt. Apr 66, 51p WMSI Working Paper-99
Contract Nonr-233 (75)
Proj. NR-047-041
Text of paper presented at the Annual Carnegie Inst. of Tech. Symposium on Gognition (2), April 7-8, 1966.

Descriptors: (*Artificial intelligence, Memory), (*Memory, *Learning machines), Learning, Programming (Computers), Pattern recognition.

As part of a series in artificial intelligence experiments, four different computer programs for concept learning were tested on five problems of varying complexity. The amount of information which a program could store while solving the problem was varied independently. Program performance could be described as a function of the location of a given study in an abstract space defined by problem complexity and the amount of memory available. The results were discussed in terms of previous work on concept learning and for their implications in the general fields of artificial intelligence and the psychology of human learning. (Author)

AD-634 484 Field 6D, 9B
CFSTI Prices: HC$4.00 MF$0.75
Stanford Research Inst., Menlo Park, Calif.
TRAINING A LINEAR MACHINE ON MISLABELED PATTERNS.
Technical rept.,
by R. O. Duda. Apr 66, 115p
Contract Nonr-3438 (00)
Proj. SRI-3605

Descriptors: (*Artificial intelligence, *Pattern recognition), Training, Linear systems, Learning machines.

A linear machine is a multicategory classifier that can be trained to classify a pattern from a set of linearly separable patterns into one of a finite number of categories. It is trained on a representative set of patterns, each pattern having been labeled with a desired category number. If the patterns so labeled are linearly separable, then training with any of several error-correction procedures will yield error-free performance after a finite number of corrections. This report is concerned with the behavior of a linear machine when the training patterns are not linearly separable. Particular attention is devoted to the nonseparable problem arising when the training patterns are randomly mislabeled. Training is viewed as a Markov process, and the behavior of the time-average linear machine is analyzed. It is shown that the time-average linear machine converges to a limiting classifier with probability one, and that this limiting classifier is optimal if the pattern vectors are orthogonal. When the pattern vectors are not orthogonal, the performance may not be optimum; however, experimental results show that averaging usually improves performance of a linear machine quite signicantly over that obtained by error-correction alone. (Author)

AD-634 514 Field 6D, 9B
CFSTI Prices: HC$8.60 MF$0.75
LTV Astronautics Div., Ling-Temco-Vought, Inc., Dallas, Tex.
STATISTICAL IMAGE RECOGNITION CONCEPT (OSIRIS).
Final rept., phase 1,
by G. R. Tenery. 29 Dec 62, 84p Rept. no. 00.140
tract Nonr-3831 (00)

Descriptors: (*Optical images, *Pattern recognition), (*Statistical analysis, Pattern recognition), Programming (Computers), Computers, Transformations (Mathematics), Images.

Identifiers: OSIRIS.

The initial process in a system for the machine recognition of imagery is an operation which produces a model or transformation which is characteristic of a particular image or class of images. This model, or transformation, is subsequently processed in a machine to produce a signal which indicates that the input image is, or is not, to some degree of probability, a particular example of a desired image or class of images. An initial PsubF (d) transformation of optical imagery was investigated at some length. Analytical expressions are obtained for the PsubF (d) transformations of rectangular figures and circles. A machine program was devised which produced PsubF (d) transformations for a more general universe of imagery. The PsubF (d) transformations thus produced are subjected to an analysis which shows the transformation to be a valid technique for the recognition of imagery both as to class membership and discrimination between images of the same class. (Author)

PB-169 603 Field 6D
CFSTI Prices: HC$1.10 MF$0.50
Lear Siegler, Inc., Santa Monica, Calif.
ARTIFICIAL INTELLIGENCE PROGRAM.
Memo rept.,
by E. Mark Gold. 21 Nov 62, 5p

Descriptors: (*Artificial intelligence, Problem solving), Semantics, Syntax, Decoding, Algorithms, Coding.

The immediate goal of artificial intelligence research is: (1) To give a formal definition of intelligence which corresponds to intuitive concept: (2) TO construct an algorithm which will generate solutions to problems, the solutions being intelligent by this definition. (Author)

PB-170 494 **Field 6D, 9B**
CFSTI Prices: HC$1.10 MF$0.50
Brooks Research, Inc., East Rochester, N. Y.
APPLICATIONS OF A METHOD OF PATTERN RECOGNITION TO BIOMEDICAL PROBLEMS,
by Kurt Enslein. 1963, 1p
From Digest of the 1962 Annual Conference on Engineering in Medicine and Biology (15th), Conrad Hilton Hotel, Chicago, Ill. November 1962.

Descriptors: (*Pattern recognition, Learning machines), (*Learning machines, Pattern recognition), Biology, Medicine, Iterative methods, Graphics, Digital computers, Simulation.

Identifiers: Perceptrons, Alpha-numeric symbols.

The method of pattern recognition is a variant of the general Perceptron methods of Holmes, et al. Recognition of mixed-font imperfect characters. 'Optical Character Recognition'. Washington, D. C., Spartan Books, 1962, p. 213-225). The method is one of dividing a multi-dimensioned space by means of planes, and a training method produces these planes. (Author)

AD-634 187 **See Field 6B**

PB-170 497 **See Field 9B**

6E. CLINICAL MEDICINE

AD-634 124 **Field 6E, 6M, 6C, 6O K**
CFSTI Prices: HC$7.00 MF$1.75
Medical Lab. (406th), San Francisco, Calif. 96343.
PROFESSIONAL REPORT, JULY 1964 THROUGH JUNE 1965.
Jun 65, 393p

Descriptors: (*Medical research, Army), (*Military medicine, Japan), Bacteria, Diagnosis, Mycobacterium tuberculosis, Diseases, Leptospira, Clostridium perfringens, Morphology (Biology), Neisseria gonorrhoeae, Antibiotics, Genetics, Enterobacteriaceae, Shigella, Chemistry, Toxicity, Radiobiology, Arthropods, Filariae, Reptiles, Insecticides, Annelida, Culicidae, Anopheles, Gastropoda, Schistosoma, Immunity, Antigens + antibodies, Epidemiology, Chemotherapy, Pathology, Blood transfusions, Veterinary medicine, Virus diseases, Enteroviruses, Rickettsia, Parasites, Japan.

Identifiers: Paragonimus.

CONTENTS: Bacteriology; Chemistry; Entomology; Medical zoology; Pathology; Serology and blood bank; Veterinary laboratory medicine; Virology and Rickettsial diseases; 406th Mobile Medical Laboratory.

AD-634 142 **Field 6E**
CFSTI Prices: HC$1.00 MF$0.50
Saskatchewan Univ., Saskatoon. Dept. of Physiology and Pharmacology.
PRECIPITIN RESPONSE TO HUMAN SERUM BY A RABBIT POPULATION. VARIATION IN RESPONSE OF NORMAL RABBITS TO A PRIMARY SERIES OF INJECTIONS.
Rept. for May 61-Jun 64,
by W. G. Glenn, and G. Bonar Sutherland. Apr 66, 12p
Contract AF 41 (657)-384
Proj. AF-7753
Task 775301
SAM-TR-66-28

Descriptors: (*Antigens + antibodies, Rabbits), (*Immune serums, Biological assay), Blood serum, Humans, Antigen-antibody reactions, Immunity, Injection (Medicine), Tolerances (Physiology), Experimental data, Immunology, Canada.

The report details the quantitative results of precipitin production in a rabbit population of 264 animals when each animal was given the same primary injection series with comparable human serum pools and the antiserums were reacted with the homologous antigen. This empirical study will help to anticipate the range of rabbit response in more limited investigations with complex antigens. The tolerance limit calculations are very large for precipitin production when random samples (groups of 10) from a population of rabbits are injected with complex antigen mixtures. The limits indicated that one can be 95% confident that at least 95% of the groups will have a mean total antigen-antibody precipitate nitrogen between 2,400 and 5,900 micrograms N/ml., if analyzed as herein described. These values pertain to the sum of all precipitinogen-precipitin reactions from antigen excess through antibody excess. This large variability makes it possible to unknowingly obtain groups of 10 animals whose response is different from that experienced in other similar studies. (Author)

AD-634 157 **Field 6E, 6M**
CFSTI Prices: HC$3.00 MF$0.75
Army Biological Labs., Frederick, Md.
IMMUNOFLUORESCENCE, AN ANNOTATED BIBLIOGRAPHY. II. VIRAL STUDIES,
by Warren R. Sanborn. Dec 65, 99p
Miscellaneous pub-3

Descriptors: (*Fluorescent antibody techniques, Bibliographies), (*Viruses, Fluorescent antibody techniques), Immunology, Arboviruses, Pox viruses, Herpetic viruses, Adenoviruses, Rabies virus, Myxoviruses, Influenza virus, Abstracts, Indexes.

Identifiers: Reoviruses, Picornavirus, Tumor viruses.

The volume is one of a series of six annotated bibliographies on various aspects of immunofluorescence and its use. Citations cover the period 1905 through 1962. Volume II contains 278 annotated literature citations, arranged according to major subject areas, and a complete author index. (Author)

AD-634 383 **Field 6E**
CFSTI Prices: HC$1.00 MF$0.50
New York Univ., N. Y. School of Medicine.
STUDIES ON ETIOLOGY OF EXPERIMENTAL SHOCK.
Final technical rept., Jun 65-Jun 66,
by R. W. Zweifach, W. Chick, and R. Weiner. 1 Jun 66, 5p
Contract DA-49-007-MD-993

Descriptors: (*Shock (Pathology), Therapy), Etiology, Hypoxia, Hemorrhage, Hypotension, Heart, Liver, Morphology (Biology), Tissues (Biology), Blood transfusions, Electrolytes (Physiology), Acid-base equilibrium, Parenteral infusions, Metabolism, Electron microscopy, Mortality rates, Rabbits.

The studies on shock during the past year dealt with two aspects of the problem: (1) a therapeutic attempt to reinforce energy sources by providing selected anaerobic substrates during the stagnant hypoxia of hemorrhagic hypotension; and (2) ultrastructural changes in heart and liver during graded hemorrhage in relation to therapy.

AD-634 466 **Field 6E, 6L, 6I**
CFSTI Prices: HC$1.00 MF$0.50
Systems Research Labs., Inc., San Antonio, Tex.
AN EMERGENCY DENTAL KIT ENCASEMENT FOR USE ON EXTRATERRESTRIAL MISSIONS,
by Jack H. Ferguson, and Jack L. Hartley. Apr 66, 13p
Contract AF 41 (609)-2724
Proj. AF-7753
Task 775303
SAM-TR-66-34

Descriptors: (*Dentistry, Astronauts), Expanded plastics, Medical equipment, Space flight, Materials, Sandwich construction, Design.

Steps were taken to construct an emergency dental kit for 'buddy' or self-care during prolonged space flight. Initial steps taken included a material study, material selection, a design study, prototype design, and destructive testing of a model. Also included is an explanation of the properties of Lexan and Nopcofoam, the materials selected, as well as of the other materials considered. A design based on sandwich construction was developed and the characteristics of this design are summarized. (Author)

AD-634 574 **Field 6E, 6A**
CFSTI Prices: HC$1.00 MF$0.50
School of Aerospace Medicine, Brooks AFB, Tex.
PHYSIOLOGIC CHEMISTRY OF THE HUMAN ORAL SECRETIONS. TOTAL PROTEIN CONTENT OF PAROTID FLUID COLLECTED WITHOUT EXOGENOUS STIMULATION.
Final rept., Jun 64-Jun 65,
by Ira L. Shannon, and James M. Terry. Mar 66, 18p SAM-TR-66-30
Proj. AF-7753
Task 775303

Descriptors: (*Saliva, Proteins), Blood serum, Blood proteins, Mouth, Hygiene, Teeth, Diseases, Secretion, Dentistry, Analysis of variance.

Parotid fluid was collected without exogenous stimulation from 508 systemically healthy young adult males. The total protein content of this fluid, along with serum from simultaneous blood collections, was determined and correlations were sought with oral health status. Serum protein was not related to either caries experience or periodontal status. An insignificant relationship was found between serum protein and parotid fluid protein. This was true when parotid fluid protein was expressed in either concentration or secretion rate in micrograms per minute. Parotid fluid protein was not significantly related to either of the oral health variables. Parotid flow rate was negatively related to parotid fluid protein concentration ($r = -.287$) and positively related to the secretion rate for this constituent ($r = .674$). Each of these coefficients was different from zero at the .01 level. (Author)

AD-634 623 **Field 6E**
CFSTI Prices: HC$1.00 MF$0.50
Walter Reed Army Inst. of Research, Washington, D. C.
THE REPLACEMENT OF LARGE VEINS WITH FREE INVERTED SEGMENTS OF SMALL BOWEL,
by Teruo Matsumoto, Robert H. Holmes, Claude O. Burdick, Charles A. Heisterkamp, and Thomas J. O'Connell Jr. Jun 66, 7p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Transplantation, *Intestines), (*Veins, Surgical techniques), Membranes (Biology), Mucus, Tissues (Biology), Surgery, Prosthetics, Histological techniques, Bacteria, Infections, Culture media, Humans, Dogs.

Experimental work indicates that inverted free segments of small bowel can be used successfully as autografts in the replacement of segments of major veins in dogs. Success has been obtained using a graft in which the mucosa, muscularis, and serosa have been removed by abrasion. The resultant tube is then comprised essentially of submucosa which provides a trellis for complete endothelialization. When the ostium of the graft is of large size, the vein can be sectioned obliquely to match the diameter of the bowel. Infection has not been a problem with any inverted graft. It is of special significance that a small bowel vein graft has been successfully used for the first time in a human patient. (Author)

AD-634 639 **Field 6E**
CFSTI Prices: HC$1.00 MF$0.50
Army Medical Research Lab., Fort Knox, Ky.
RED CELL FRAGILITY AND BLOOD PRESERVATION - THE OSMOGRAM,
by Charles E. Shields, and Frank R. Camp Jr.Jun 66, 15p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceeding available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Erythrocytes, Preservation), Hemolysis, Osmosis, Hemoglobin, Measurement, Spectrophotometers, Additives, Blood transfusions, Storage, Test methods.

Identifiers: Osmograms.

Testing of osmotic fragility in blood stored for various intervals demonstrated an increased tendency to hemolyze in hypotonic solutions. Though not evident immediately after severe experimental trauma, the results showed diminished ability to survive during storage. In the osmogram method employed in this study, certain values were found to be more sensitive indicators of osmotic fragility. In addition to those recipients receiving stored blood in autotransfusions, the post-transfusion survival percentage could be correlated with osmotic fragility tests. In this study, the slope value measurements approaching the value of 1.00 were found in those having the better post-transfusion percentages. Application of these findings may be useful in predicting the ability of various stored blood units to survive in the recipient. The method may also be applied in comparing preservation in units after use of various additives. Finally, the blood bank may screen for units still useful for transfusion prior to expiration leading to better conservation of the supply of stored blood. (Author)

AD-634 643 **Field 6E, 6P, 6S**
CFSTI Prices: HC$1.00 MF$0.50
Walter Reed Army Inst. of Research, Washington, D. C.
PATTERN OF PHYSIOLOGICAL VARIABLES IN SLOW BLOOD LOSS SHOCK,
by Karl Stecher Jr. Jun 66, 11p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Shock (Pathology), *Hemorrhage), Physiology, Cannulation, Electrocardiography, Electroencephalography, Surgical techniques, Medical examination, Respiration, Blood pressure, Blood volume, Stress (Physiology), Monkeys.

A new method of studying the effects of hemorrhage in monkeys was devised. Animals were extensively instrumented, placed in Walter Reed type primate chairs, and allowed to recover from operation before the experiments began. This study of the natural history of hemorrhagic shock can be of great value to physicians responsible for patients in shock or in an impending shock state. ABP's fall does not occur until considerable blood volume has been lost. Heart rate should then be followed closely as a first indicator of blood loss, and as a more critical indicator of the progression of such loss. Respiratory rate seems a valid indicator of the initial large fall in ABP, and may be used to indicate that this fall has occurred when the patient's normal pressure is unknown.

AD-634 660 **Field 6E, 6S, 6M**
CFSTI Prices: HC$1.00 MF$0.50
Army Medical Unit, Fort Detrick, Md.
THE IMPACT OF ACUTE INFECTION ON METABOLISM IN HUMAN SUBJECTS,
by William R. Beisel, and Dan Crozier. Jun 66, 12p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Infectious diseases, Metabolism), Pasteurella, Diseases, Coxiella, Virus diseases, Fevers, Infections, Nitrogen, Antibiotics, Chemotherapeutic agents, Corticosteroid agents, Electrolytes (Physiology), Sodium, Chloride, Diet, Kidneys, Immunity, Body temperature.

Identifiers: Pappataci fever, Anorexia.

Detailed metabolic balance studies were conducted in 76 volunteers during tularemia, sandfly fever, Q fever, or during investigations of variables pertinent to acute infection. With the onset of symptoms in each infection, the balance of nitrogen and other intracellular elements became negative; cumulative losses persisted long into convalescence. In contrast, an early period of nitrogen retention developed during mild illness and after the exposure of vaccinated subjects. This implied that both anabolic and catabolic changes were stimulated by infection, with catabolism generally predominant. Sodium and chloride were lost during early illness, but were then retained by the kidney in coincidence with an increase in aldosterone output. Anorexia and fever were important factors in producing catabolic changes, but adrenal glucocorticoid excess and antibiotic administration had little direct effect on metabolic balances. (Author)

AD-634 670 **Field 6E, 6R**
CFSTI Prices: HC$1.00 MF$0.50
Army Missile Command, Redstone Arsenal, Ala. Electromagnetics Lab.
A LASER DEVICE FOR USE IN CLINICAL TREATMENT OF MALIGNANT TUMORS,
by James R. Dearman, W. B. McKnight, and R. W. Hawkins. Jun 66, 15p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Cancer, Therapy), (*Lasers, Surgical techniques), Skin, Burns, Morphology (Biology), Pathology, Histology, Medical equipment, Mice, Rabbits, Monkeys.

A series of cooperative experiments between the National Cancer Institute and the Army Missile Command began in late 1963 with treatment of two separate tumor systems in two different strains of mice. The first group consisted of 96 female CxDBA/F1 hybrid mice with a single Cloudman S91 melanoma implant in each. Forty-four of these mice were exposed to laser radiation and fifty-two were untreated and used for controls to determine the difference in survival between the two groups. The second group consisted of seventy-three female C57BL/6JN mice with a single Lewis T241 sarcoma implant in each. Thirty-three of these mice had the sarcoma exposed to the laser; forty were untreated controls. The results of this test are discussed.

AD-634 766 **Field 6E**
CFSTI Prices: HC$3.00 MF$0.75
Aerospace Medical Div., Air Force Systems Command, Brooks AFB, Tex.
FOREIGN DEVELOPMENTS IN PROSTHETICS,
by Howard S. Friedman, and Forrest R. Ratliff.
Jun 66, 68p AMD-CR-01-4-66
Proj. AMD-7756
Task 718407
TT-61576

Descriptors: (*Prosthetics, USSR), Medicine, Plastic surgery, Mechanical organs, Artificial limbs, Electrophysiology, Musculoskeletal system, Urinary system, Kidneys, Esophagus, Blood vessels, Throat, Ear, Nerves, Blood circulation, Heart.

The report supplies information and evaluation of Soviet developments and application in the area of alloplasty and alloplastic materials. The general fields of biostimulation and bioelectric control as applied to various prosthetic devices are discussed, as well as the application from these areas to future developments, not only in various aspects of clinical medicine, but also in industrial, commercial, and training situations, as well as to certain areas of aerospace operations. (Author)

PB-169 209 **Field 6E, 6M**
CFSTI Prices: HC$1.00 MF$0.50
Cornell Univ., New York. Medical Coll.
THE EFFECT OF HYPERBARIC OXYGEN ON MICROORGANISMS IN VITRO AND IN VIVO.
Final rept.
1963, 13p
Grant PHS-PH-86-62-170

Descriptors: (*Oxygen, Therapy), (*Microorganisms, Oxygen), In vivo analysis, In vitro analysis, Infections, Animals, Clostridium perfringens, Clostridium tetani, Escherichia coli, Aerobacter aerogenes, Pseudomonas aeroginosa, Salmonella, Proteus, Diplococcus pneumoniae, Staphylococcus aureus, Streptococcus pyogenes.

The purpose of this research was to study the effect of oxygen under pressure on microorganisms in vitro and to investigate the influence of oxygen therapy on infections in animals.

PB-169 442 **Field 6E, 5J**
CFSTI Price: HC$1.60
Walter Reed Army Inst. of Research, Washington, D. C.
THE RHINENCEPHALON AND BEHAVIOR,
by Leon Schreiner, and Arthur Kling. Jan 65, 14p
WRAIR-29-56
Proj. 6-60-10-016

Descriptors: (*Brain, Behavior), Animals, Sex, Nervous system, Physiology, Endocrine glands, Psychiatry.

Lesions of the rhinencephalon, primarily restricted to the amygdaloid nuclei, modify aggressive behavior of lynxes, agoutis, monkeys, and cats toward relative docility, and precipitate a chronic state of hypersexuality. Some neuro-endocrine mechanisms bearing upon these findings are discussed. (Author)

PB-170 669 **Field 6E**
CFSTI Prices: HC$1.00 MF$0.50
Tufts Univ., Boston, Mass. School of Medicine.
DEVELOPMENT OF THE IN-VITRO LYMPHOCYTE-LYMPHOCYTE INTERACTION AS A TEST FOR HISTOCOMPATIBILITY.
Semiannual progressr ept., 1 Jun 65-31 Mar 66,
by Howard N. Harrison. 31 Mar 66, 23p
Contract PH4-3-65-633

Descriptors: (*Immunology, Transplantation), (*Transplantation, Tissues (Biology)), (*Tissue culture cells, Lymphocytes), (*Lym-

phocytes, Transplantation), Compatibility, Histology, In vitro analysis, Culture media, Insulin, Tissue culture, Corticosteroid agents, Antigens + antibodies, Cell division, Autoradiography, Labeled substances, Desoxyribonucleic acids, Proteins, Tracer studies, Rabbits, Thymidines, Mitosis, Hamsters.

Studies of a tissue matching system are being done using the cell-culture interaction of live lymphocytes from prospective tissue recipients and a sonicated cell extract from prospective donors. The present phase emphasizes methodology in the areas of: (1) Cell isolation to give high yield, controlled composition and high livability. (2) Evaluation of optimal culture conditions, including the source of serum, and the use of chemically defined media with insulin and hydrocortisone supplementation. (3) The development of a uni-directional reaction using live cells from a prospective graft recipient and a sonicated antigenic cell lysate from a prospective donor. (4) The evaluation of present techniques used for assessing the reaction and the development of new, more direct techniques. (5) Rabbit and hamster lymphocytes are being studied because of the fav orable populations for the study of genetic differences that can be readily obtained in such species. (Author)

PB-170 670 **Field 6E**
CFSTI Prices: HC$1.00 MF$0.50
California Univ., Los Angeles. School of Medicine.
STUDIES IN LEUKOCYTE TYPING.
Semiannual contract progress rept. 22 Jun-22 Dec 65,
by Gary M. Troup. 22 Dec 65, 8p
Contract PH-43-65-657

Descriptors: (*Leukocytes, Immune serums), (*Immune serums, Leukocytes), Preparation, Toxicity, Biological assay, Adsorption, Antigens ;a ntibodies, Immunity, Tests, Blood groups.

Limitedly specific antisera were produced by adsorption of multispecific antisera with normal human leukocytes. Further studies with the lymphocytotoxic assay system were conducted. (Author)

PB-170 671 **Field 6E**
CFSTI Prices: HC$1.00 MF$0.50
California Univ., Los Angeles.
TESTING LEUKOCYTE ANTISERA ON LYMPHOCYTES OF KIDNEY TRANSPLANT PATIENTS AND DONORS, REDIRECTED TO: PRODUCTION OF GROUPED LEUKOCYTE TYPING SERA.
Semi-annual contract progress rept. 1 Sep 65-1 Mar 66,
by Paul I. Terasaki. 1 Mar 66, 3p
Contract PH-43-65-994

Descriptors: (*Leukocytes, Immune serums), (*Immune serums, Leukocytes), Blood groups, Lymphocytes, Kidneys, Transplantation, Tests, Immunity, Females.

Employing the lymphocyte cytotoxicity test, 120 active sera from multiparous women were cross-compared to the reactivities of 90 antisera provided by other workers. From a computer analysis of the reactions, it has been found that 6 major serum groupings could be readily distinguished. Sera representing 5 of the major groups were obtained. Eight grouped antisera representing 5 different specificities were supplied during a period of less than 6 months.

UCRL-14658 **Field 6E**
CFSTI Prices: HC$2.00 MF$0.50
Lawrence Radiation Lab., Univ. of California, Livermore.
ISCHEMIC HEART DISEASE, ATHEROSCLEROSIS, AND LONGEVITY,
by John W. Gofman, Wei Young, and Robert Tandy. 1 Feb 66, 37p
Contract W-7405-eng-48

Descriptors: (*Heart, Pathology), (*Atherosclerosis, Cholesterol).

For abstract, see N 20 12.

AD-634 152 **See Field 6C**

AD-634 266 **See Field 6S**

AD-634 374 **See Field 6T**

AD-634 683 **See Field 6C**

PB-169 699 **See Field 5B**

PB-169 829 **See Field 6S**

PB-169 871 **See Field 6P**

PB-170 421 **See Field 5B**

PB-170 424 **See Field 5B**

PB-170 487 **See Field 6L**

PB-170 678 **See Field 6M**

PB-170 679 **See Field 6M**

PB-170 680 **See Field 6M**

PB-170 681 **See Field 6M**

PB-170 682 **See Field 6M**

PB-170 683 **See Field 6M**

PB-170 684 **See Field 6M**

6F. ENVIRONMENTAL BIOLOGY

PB-169 893 **Field 6F, 13B**
CFSTI Prices: HC$4.60 MF$0.50
Commissariat a l'Energie Atomique, Pierrelatte (France). Centre de Pierrelatte.
ESSAIS TOXICOLOGIQUES DE PRODUITS CHIMIQUES SUR DES POISSONS D'EAU DOUCE (Chemical Products Toxicological Tests Performed on Lake and River Fish),
by Francoise Teulon, and Claude Simeon. Apr 66, 49p CEA-R-2938
Text in French; Attached Summary in English.

Descriptors: (*Water pollution, Fishes), (*Wastes (Industrial), Toxicity), (*Fishes, Toxic tolerances), Sewage, Chemicals, Ions, Lethal Dosage, Lakes, Rivers, France.

The volume and toxical values of industrial and urban effluents are growing higher and therefore acute or chronic pollution hazard is proportionally increased. Hence it is necessary to determine the effluent components minimum lethal dose for fish (one hour or six hours according to applicable standards). The following tests are described in the report: toxicity of some chemical products, tested individually: sodium, sulphate, sodium chloride, sodium fluoride, etc...; toxicity of some metal ions:Al(3+), Fe(++), Fe(3+), Pb(++), etc...; toxicity of certain mixed compounds for various fish species (sun perch, tench, gold fish, roach, gudgeon, bleak). The test results obtained represent local values and may be used for reference and as a general basis for other investigation and calculation of the effluents data when released. (Author)

AD-634 124 **See Field 6E**

AD-634 266 **See Field 6S**

AD-634 271 **See Field 6P**

AD-634 391 **See Field 4B**

AD-634 692 **See Field 13B**

6G. ESCAPE, RESCUE, AND SURVIVAL

AD-634 266 **See Field 6S**

6H. FOOD

AD-634 252 **Field 6H, 11C**
CFSTI Prices: HC$3.00 MF$0.75
Archer Daniels Midland Co., Minneapolis, Minn.
EDIBLE COATINGS FOR DRIED AND COMPACTED FOODS: PART II.
Final technical rept. pt-2,
by Morton S. Cole. May 66, 65p
Contract DA-19-129-AMC-102 (N)
oj. DA-7X84-06-033
USA-NLABS-FD-48, USA-NLABS-TR-66-38-FD
See also AD-633 044.

Descriptors: (*Food, *Coatings), Dehydrated food, Protective treatments, Moisture, Oxidation, Molds (Organisms), Storage, Preservation, Freeze drying, Films, Degradation, Rods, Preparation, Effectiveness.

Edible thermoplastic coatings were applied as moisture-oxygen barriers to dry bars representing a wide range of food compositions. A hot-melt curtain coating technique appears commercially feasible for all foods examined; however, coatings so applied failed to withstand storage at a temperature cycling between -18 and 40C. (Author)

AD-634 346 **Field 6H**
CFSTI Prices: HC$1.00 MF$0.50
Army Foreign Science and Technology Center, Washington, D. C.
MANUFACTURE OF MARGARINE FROM HIGH CONCENTRATION ARTIFICIAL FOOD EMULSIONS BY ATOMIZING IN VACUUM,
by N. I. Kozin, and E. M. Padaryan. Jun 66, 9p
FSTC-HT-23-108-66
TT-66-61508
Trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Pishchevaya Tekhnologiya (USSR) n6 p61-4 1965.

Descriptors: (*Vegetable oils, Food), (*Food, Manufacturing methods), Vacuum, Atomization, Colloids, USSR.

Identifiers: Margarine.

Results are presented from an experimental program to develop a margarine having the consistency of creamery butter by vacuum atomization of artificial emulsions using dry milk proteins as the emulsifier. The resulting margarine has a coagulation-crystalline structure and stands up well at the normal temperatures. (Author)

AD-634 347 **Field 6H, 6A**
CFSTI Prices: HC$1.00 MF$0.50
Army Foreign Science and Technology Center, Washington, D. C.
PRECIPITATION OF INVERTASE FROM YEAST AUTOLYSATES BY AMMONIUM SULFATE,
by V. P. Sotskaya, V. A. Smirnov, and L. Ya. Tikhomirova.
Jun 66, 10p FSTC-HT-23-102-66
TT-66-61507
Trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Pishchevaya Tekhnologiya (USSR) n6 p39-42 1965.

Descriptors: (*Yeasts, Enzymes), (*Glycoside hydrolases, Chemical precipitation), Ammonium compounds, Sulfates, Separation, Beverages, USSR.

Identifiers: Ammonium sulfate, Invertase.

Test results are presented for precipitation of invertase from autolysates of baker's and brewer's yeasts. Production of invertase from sedimentary

beer yeast at breweries with full use of sulfate solutions for yeast cultivation is recommended. (Author)

AD-634 673 **Field 6H**
CFSTI Prices: HC$1.00 MF$0.50
Army Natick Labs., Mass. Food Div.
HIGH ENERGY SYNTHETIC COMPOUNDS FOR FUTURE COMPACT COMBAT RATIONS,
by Henry A. Dymsza, Gilbert S. Stoewsand, and Stephen M. Swift. Jun 66, 14p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Glycerols, Military rations), (*Glycols, Military rations), (*Military rations, Synthesis (Chemistry)), Energy, Nutrition, Food, Organic compounds.

Identifiers: Butanediols, Propylene glycols.

Data were presented to show that synthetically produced 1,3-butanediol, propylene glycol and glycerol, which are not normal food sources, can be used to supply dietary calories. All 3 compounds were utilized by animals under a variety of experimental conditions. The results obtained indicate that many problems remain, but that these compounds can serve as models. Nevertheless, the data support the concept that other more potentially useful food compounds can be found, designed, or synthesized. Such compounds, therefore, offer a new approach in the development of nutritionally and logistically ultra-efficient, 'tailor designed', combat rations of the future. At the same time, development of a means of producing food completely independent of land cultivation may serve to promote international stability and peace by counteracting hunger among the world's rapidly multiplying peoples. (Author)

PB-169 982 **Field 6H**
CFSTI Price: HC$1.10
Hormel Inst., Univ. of Minnesota, Austin.
STUDY OF FACTORS INFLUENCING OXIDATION WHICH OCCUR IN IRRADIATED FATS. EFFECT OF HIGH ENERGY IRRADIATION ON THE STABILITY OF FATS.
Progress rept. no. 1, 31 Dec 58-30 Jun 59,
by W. O. Lundberg. 30 Jun 59, 8p
Contract DA-19-129-QM-1350
Proj. DA-7-84-01-002
AD235 586

Descriptors: (*Irradiated foods, Fats), (*Fats, Radiation damage), Stability, Oxidation, Gamma rays, Storage.

Samples of methyl myristate containing several common antioxidants have been irradiated under vacuum or oxygen with up to 8 million rads of gamma rays. The destruction of the antioxidants during irradiation and during subsequent storage at room temperature, 2 C, and -20 C, has been studied by chemical means. Irradiation under vacuum destroyed an appreciable portion of the antioxidants and the amount of destruction increased with the irradiation dose. In the presence of oxygen the antioxidants were more easily destroyed during irradiation and the effect of dose was not consistent. Destruction of antioxidants during post-irradiation storage was negligible compared to the loss of antioxidant resulting from irradiation. (Author)

TID-22509 **Field 6H, 18B**
CFSTI Prices: HC$3.00 MF$0.75
Florida Univ., Gainesville. Dept. of Food Technology and Nutrition.
EFFECTS OF LOW-LEVEL IRRADIATION UPON THE PRESERVATION OF FOOD PRODUCTS.
Annual rept.,
by R. A. Dennison, M. S. Merkley, and E. M. Ahmed. Apr 65, 89p
Contract AT (40-1)-3097

Descriptors: (*Irradiated foods, Fruits), (*Fruits, Preservation).

For abstract, see N 20 12.

AD-634 266 **See Field 6S**

AD-634 415 **See Field 7E**

AD-634 720 **See Field 15E**

PB-170 302 **See Field 5C**

UH-235P5-1 **See Field 18B**

6I. HYGIENE AND SANITATION

AD-634 266 **See Field 6S**

AD-634 466 **See Field 6E**

6J. INDUSTRIAL (OCCUPATIONAL) MEDICINE

AD-634 456 **Field 6J, 6S**
CFSTI Prices: HC$2.00 MF$0.50
Human Engineering Labs., Aberdeen Proving Ground, Md.
FURTHER STUDIES OF THE RELIABILITY OF TEMPORARY THRESHOLD SHIFT FROM IMPULSE-NOISE EXPOSURE.
Technical memo.,
by David C. Hodge, and R. Bruce McCommons. Apr 66, 46p TM-3-66

Descriptors: (*Noise, *Thresholds (Physiology)), Exposure, Reliability, Hearing, Audiometry, Army personnel.

Three studies were conducted to determine the reliability, under various exposure conditions, of temporary threshold shift (TTS) produced by impulse noise. The subjects, who were representative of the Army population, were tested at frequencies throughout the range of human hearing. Individual subjects' TTSs were not consistent enough to permit any meaningful generalizations. However, group-mean TTS was a reliable measure of impulse-noise effects for subjects with both normal and subnormal hearing, and throughout the range of audible frequencies. Basing interpretations on these types of data should insure that results from various tests will be comparable. (Author)

AD-634 457 **Field 6J, 6P, 5J**
CFSTI Prices: HC$1.00 MF$0.50
Human Engineering Labs., Aberdeen Proving Ground, Md.
NOISE LOCALIZATION AFTER UNILATERAL ATTENUATION.
Technical memo.,
by Robert W. Bauer, John L. Matuzsa, Raymond F. Blackmer, and Sam Glucksberg. Apr 66, 18p TM-4-66

Descriptors: (*Noise, *Auditory perception), (*Hearing, Positioning reactions), Audiometry, Position finding, Attenuation.

Partial hearing loss was simulated by insertion of V51-R plastic ear plugs. Subjects wore plugs continuously for periods ranging from six hours to three days. Predictable shifts in localization errors were observed when the stimulus was a broadband noise made up of frequencies above 3000 cycles per second. Reorientation in azimuth localization with ear plugs inserted required three days or more unless accelerated by specific training. (Author)

6K. LIFE SUPPORT

AD-289 611 **Field 6K**
CFSTI Price: HC$6.00
North American Aviation, Inc., Los Angeles, Calif.
POTASSIUM SUPEROXIDE CANISTER EVALUATION FOR MANNED SPACE VEHICLES.
Technical documentary rept.,
by A. W. Optican. Sep 62, 293p NA-62-283
Contract AF 33 (616)-8323
Proj. AF-6146
Task 614608
ASD-TDR-62-583

Descriptors: (*Closed ecological systems, Spaceships), (*Oxygen, Carbon dioxide), Potassium compounds, Oxides, Absorption, Gas generating systems, Adsorption, Catalysts, Phosphorus compounds, Humidity, Temperature, Control systems, Air conditioning equipment.

Experimental techniques used and results obtained are reported for studies of the effects of simultaneous multiple operating parameters on K02 canisters in manned space vehicles. Actual experiments using rodents, men, and simulated-man, are discussed. Experimental characteristics of single and dual canister (demand) atmosphere composition control systems are analyzed. The best method for experimental definitive Respiratory Quotient matching is described. A new annular screen device for a chemical canister which prevents blocking of the airflow in granular solid chemical bed due to humidity is described. A canister design method was developed to determine basic K02 canister sizes for atmosphere composition control system tests on a real-time, one-man basis. The dominant role of PC02 in establishing the C02 adsorption rate and the 02 generation rate as well as the roles of absolute humidity and catalysts in establishing the 02 generation rate are discussed. A series of comparative tables and curves is presented for 02-C02 generation and adsorption support levels for one man. (Author)

AD-634 315 **Field 6K, 10B**
CFSTI Prices: HC$1.00 MF$0.50
Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
EFFECTS OF ORAL ADMINISTRATION OF A FUEL CELL PRODUCT WATER TO MACACA MULATTA.
Final rept., Jan-Feb 65,
by Ralph F. Ziegler. Mar 66, 25p AMRL-TR-65-175
Contract T-31248-G
Proj. 6302
Task 630201
Prepared in cooperation with Aerojet General Corp., Dayton, Ohio. Toxic Hazards Research Unit.

Descriptors: (*Water supplies, *Life support), (*Fuel cells, Water supples), Monkeys, Toxicity, Body weight, Hematology.

A fuel cell product water, proposed as a supply of drinking water in space vehicles, was administered to Macaca mulatta at a rate of 35 ml per kg twice daily as the sole source of fluid intake for a 14-day period. Two of eight animals exhibited body weight and hematologic changes that were directly related to enteric disturbances. These, however, were apparently of a spontaneous nature since one of two control animals was also affected, although somewhat less severely. No apparent subacute oral toxicity of the fuel cell product water was demonstrated in monkeys. This indicates that product water having similar chemical and physical properties should present no serious hazard to humans when consumed as drinking water for short periods of time. (Author)

N66-14556 **Field 6K**
CFSTI Prices: HC$3.00 MF$0.75
Northrop Space Labs, Hawthorne, Calif.
TECHNOLOGY STUDY OF PASSIVE CONTROL OF HUMIDITY IN SPACE SUITS,

by E. W. Bentilla, C. Cafaro, A. P. Shlosinger, and W. Woo. Sep 65, 79p NSL-65-87-3
Contract NAS2-2102
NASA-CR-69098

Descriptors: *Humidity, *Space suit, *Water vapor.

For abstract, see T 66 15.

N66-15349 **Field 6K**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Houston, Tex. Manned Spacecraft Center.
WASTE MANAGEMENT AND PERSONAL HYGIENE FOR EXTENDED SPACECRAFT MISSIONS,
by N. Belasco, and D. M. Perry. 1964, 43p
NASA-TM-X-57096
Presented at the Am. Ind. Hyg. Conf., Philadelphia, Apr 26-30 1964.

Descriptors: *Hygiene, *Waste disposal, *Manned spacecraft, *Space mission.

SAN-575-12 **Field 6K, 22B**
CFSTI Prices: HC$7.38 MF$2.00
Garrett Corp., Los Angeles, Calif. Airesearch Mfg. Div.
APPLICATION OF RADIOISOTOPES TO MANNED SPACECRAFT LIFE-SUPPORT SYSTEMS. VOLUME I. TECHNICAL. VOLUME II. APPENDIXES.
Summary rept.
Jul 65, 438p
Contract AT (04-3)-575

Descriptors: (*Manned spacecraft, Life support), (*Life support, Radioactive isotopes).

For abstract, see N 20 12.

6L. MEDICAL AND HOSPITAL EQUIPMENT

PB-170 487 **Field 6L, 14B, 6E**
CFSTI Prices: HC$1.00 MF$0.50
Missouri Univ., Columbia. Engineering Experiment Station.
A VERSATILE EXPERIMENTAL HYPOTHERMIC-HYPERBARIC OXYGEN CHAMBER FOR WHOLE ORGAN PRESERVATION,
by R. D. Young, A. Seaber, C. H. Almond, and J. W. Mackenzie. Mar 66, 8p EES Series-62
Grant PHS-HE-07816-02

Descriptors: (*Tissues (Biology), Preservation), (*Storage tanks, Tissues (Biology)), Hypothermia, Pressure, Temperature, Medical equipment, Oxygen, Implants, Transplantation, Controlled atmospheres, Portable.

The advent of whole organ transplantation demands the necessity of having an organ available for implantation when the recipient is prepared. In order to accomplish this it is necessary to have the organ readily available in a viable sterile condition. A hypothermic-hyperbaric oxygen chamber was needed for investigations in this field. A unit was designed and built which is low in cost, safe, and is versatile in controlling pressure, temperature, nutrient solution exchange, sterility, physiological lead components and visibility.

AD-634 266 **See Field 6S**

AD-634 466 **See Field 6E**

AD-634 617 **See Field 7C**

6M. MICROBIOLOGY

AD-634 306 **Field 6M, 12A**
CFSTI Prices: HC$1.00 MF$0.50
Michigan State Univ., East Lansing. Dept. of Statistics.
MODELS FOR ANTIBODY ATTACHMENT TO VIRUS AND BACTERIOPHAGE.
Technical rept.
by J. Gani. May 66, 23p MSU-RM-158, JG-11
Contract Nonr-2587 (05), Grant PHS-GM-13138-01
Prepared in cooperation with University of Sheffield (England) Rept. No. RR-11/JG-4.

Descriptors: (*Viruses, Antigens + antibodies), (*Bacteriophages, Antigens + antibodies), (*Antigen-antibody reactions, Mathematical models), Stochastic processes, Biometry, Equations, Probability, Infections.

Several interesting mathematical problems concerned with partition into classes, and surface covering are suggested by the physical mechanisms and geometry of antibody attachment to virus particles. This paper outlines some of the recent work done in this area by Yassky (1962), the author (1965a, and b), Moran and Fazekas de St. Groth (1962) and Gilbert (1965), adds a model and other extensions of the author, and concludes with a suggestion for further investigations. The author has endeavoured throughout to hold the mathematical argument at a simple level, and to emphasize the model-building aspect of the work, in the hope that virologists may be tempted to use and perhaps verify experimentally some of the models put forward. (Author)

AD-634 620 **Field 6M**
CFSTI Prices: HC$1.00 MF$0.50
Army Medical Unit, Fort Detrick, Md.
THE INFLUENCE OF AN ARBOVIRUS INFECTION ON HOST-CELL RIBONUCLEIC ACID AND PROTEIN SYSTHESIS,
by George Lust. Jun 66, 13p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Virus diseases, Ribonucleic acids), (*Proteins, Biosynthesis), (*Ribonucleic acids, Biosynthesis), Arboviruses, Infections, Liver, Brain, Enzymes, Cytoplasm, Tissue culture, Purification, Mice.

The results show that protein synthesis and ribonucleic acid synthesis are indeed affected by this virus infection. During the incubation period of the disease liver protein synthesis was markedly diminished but returned to normal levels before severe illness occurred. Although this virus manifests its virulence by means of central nervous system involvement, protein synthesis in the brain was not altered measurably during the infection. In L-cells the virus infection depressed protein and ribonucleic acid synthesis early during infection and subsequently returned to normal levels when mature virus was released. The data indicated that the virus interfered directly with the host protein-synthesizing mechanism, and that the activity of the host, nuclear RNA-polymerase was inhibited during the infection. While overall protein synthesis was depressed a new host enzyme was synthesized in the cytoplasm of infected cells which is involved in the formation of new viral ribonucleic acid. Several parameters required for optimal enzyme activity have been determined for this induced, cytoplasmic RNA-polymerase of L-cells. Further purification of the enzyme has not been possible because of its labile nature. Thus far we have been unable to demonstrate the presence of this enzyme in tissues of VEE virus infected mice. (Author)

PB-170 678 **Field 6M, 6E**
CFSTI Prices: HC$2.00 MF$0.50
Baylor Univ., Houston, Tex. Coll. of Medicine.
WORLD HEALTH ORGANIZATION INTERNATIONAL REFERENCE CENTRE FOR ENTEROVIRUSES.
Semi-annual contract progress rept. 1 Sep 65-1 Mar 66,
by Joseph L. Melnick. Mar 66, 29p
Contract PH-43-63-1174

Descriptors: (*Enteroviruses, Immune serums), (*Immune serums, Enteroviruses), Equines, Rubella, Epidemiology, Pregnancy, Infants, Diarrhea, Echo virus, Culture media, Purification, Antigens + antibodies.

Identifiers: Rhinoviruses.

Contents: Coordination of and participation in studies on reference reagents; Testing program on enterovirus horse sera; Other enterovirus horse sera for further cooperative testing; Identification and characterization of candidates for new enterovirus types: Further studies with DN-19; Studies on rubella; Further studies on isolation of virus from infants with congential rubella syndrome or a history of maternal rubella in the first trimester of pregnancy; International Collaborative Study on Rubella - serological epidemiology; Further studies on infantile diarrhea and control specimens from Karachi, Pakistan, 1964; Further studies on rhinoviruses; Participation in the WHO Collaborative Rhinovirus Program; Purification and biophysical properties of rhinoviruses; Concentration of viruses on aluminum phosphate and aluminum hydroxide precipitates; Plaque enhancement of enteroviruses by MgCl2, cysteine and pancreatin; Materials supplied to other laboratories; Advanced training program in virology; Exchange of epidemiological and laboratory data.

PB-170 679 **Field 6M, 6E**
CFSTI Prices: HC$1.00 MF$0.50
Parke, Davis and Co., Detroit, Mich.
PREPARATION OF ANTIGENS AND ANTISERA FOR INFLUENZA VIRUS TYPES.
Semi-annual contract progress rept. 1 Sep 65-1 Mar 66,
by William B. Beardmore. 1 Mar 66, 23p
Contract PH-43-62-841

Descriptors: (*Influenza virus, Immune serums), (*Immune serums, Preparation), Antigens + antibodies, Freeze drying, Packaging, Embryonated egg technique, Chickens, Test methods.

During this period, the preparation, freeze-drying, final packaging and final testing of the following influenza antigen and antiserum pools has been completed: A/PR-8/34; A1/FM-1/47; A/Swine/31; A2/Asian/170/62; A2/Japan/305/57; B/Maryland/1/59; B/Great Lakes/1739/54; B/Taiwan/2/62; B/Lee/40; and C/Taylor/1233/47. Preparation of the following five new lots of influenza virus agent pools and antisera has been negotiated: A2/Taiwan/1/64; A/Equine-1/Prague/56; A/Equine-2/Miami/1/63; A/WS/33; and B/Singapore/3/64. The passage and testing of all of these viruses for the preparation of master seeds, immunization of roosters for antiserum, and for the Agent Pools is in progress. Material which appears to be satisfactory for immunization of roosters and for Agent Pool has been prepared for the A/WS/33 virus. Virus is being passed for the preparation of the immunizing and agent pools for the B/Singapore. Antisera production will be started in the very near future. Roosters have been obtained and tested for the presence of pre-existing antibody.

PB-170 680 **Field 6M, 6E**
CFSTI Prices: HC$1.00 MF$0.50
California State Dept. of Public Health, Berkeley. Viral and Rickettsial Disease Lab.
STANDARDIZATION OF PICORNAVIRUS IMMUNE SERA.
Semi-annual contract progress rept. 1 Sep 65-1 Mar 66,
by Edwin H. Lennette, and Nathalie J. Schmidt. 1 Mar 66, 12p
Contract PH-43-62-129

Descriptors: (*Viruses, Immune serums), (*Immune serums, Viruses), Echo virus, Parainfluenza virus, Enteroviruses, Adenoviruses, Biological assay, Contamination, Test methods.

Identifiers: Hemagglutination-inhibition tests, Reoviruses, Rhinoviruses, Picornaviruses.

Testing for homotypic and heterotypic neutralizing activity has been completed on immune sera to echovirus type 28 and rhinovirus strain 353 prepared in large animal species. Sera were assayed for heterotypic activity against 63 enteroviruses, 3 reoviruses and 6 rhinoviruses. Most of the heterotypic titers observed were low, but some sera had high titers for the reoviruses and a few echoviruses. Serum neutralization breakthrough tests for purity have been completed on 5 rhinovirus pools (types UP2, UP3, UP4, UP5 and UP6). The UP2 pool would appear to be contaminated with rhinovirus type UP5; the other rhinovirus lots were found to be pure. Hemagglutination inhibition tests were performed on immune sera to parainfluenza virus types 1, 2 and 3. The parainfluenza type 1 serum was found to have a low homotypic titer, and the parainfluenza type 3 serum had heterotypic titers for the Sendai strain of type 1 virus and the SV-5 strain of type 2 virus. Adenovirus types 3, 7a, 9, 11, 12, 14, 15, 16, 17, 18, 21, 22, 23, 24, 25, 28, 29 and 30 have been received and titrated by the method of Rowe to determine their suitability for use in neutralization tests. Usable lots of virus were found for all types except 18. (Author)

PB-170 681 **Field 6M, 6E**
CFSTI Prices: HC$1.00 MF$0.50
Baltimore Biological Lab., Md.
PREPARATION OF MYCOPLASMA ANTIGENS AND ANTISERA.
Semi-annual contract progress rept. 1 Sep 65-1 Mar 66,
by Norman F. Robillard. 1 Mar 66, 11p
Contract PH-43-62-839

Descriptors: (*Mycoplasma, Immune serums), (*Immune serums, Preparation), Pleuropneumonia-like organisms, Antigens + antibodies, Freezing, Viability, Culture media, Standardization, Stability, Equines, Rabbits.

For abstract, see T 66 15.

PB-170 682 **Field 6M, 6E**
CFSTI Prices: HC$2.00 MF$0.50
Baylor Univ., Houston, Tex. Coll. of Medicine.
PREPARATION OF IMMUNE SERUM SERUM TO ENTEROVIRUSES.
Semiannual progress rept. for 1 Sep 65-1 Mar 66,
by Joseph L. Melnick, and Bettylee Hampil. 11 Mar 66, 37p
Contract PH43-62-127

Descriptors: (*Enteroviruses, Immune serums), (*Immune serums, Preparation), Coxsackie virus, Echo virus, Poliomyelitis virus, Antigens + antibodies, Purification, Embryonated egg technique, Tissue culture, Tests, Freezing, Equines.

Eight enterovirus fluids intended for use as reference seed and concentrated antigens were tested for virus infectivity and identity. These were coxsackieviruses A3, A16, and echoviruses 15, 21, 29, 30, and 31. The tests were satisfactory and the concentrated antigens were released for use in the immunization of horses. The release of the echovirus antigens completes the projected program for preparation of echovirus immune serum in horses. Certification tests for infectivity, identity and purity were completed on seven ampuled reference seeds (poliovirus 1 Mg-stabilized; poliovirus 2 original fluid, and Mg-stabilized; coxsackievirus B2 original fluid; coxsackievirus A9 Mg-stabilized; and echoviruses 11, 14 Mg-stabilized). All were satisfactory except coxsackievirus A9, which was found to be contaminated with poliovirus 1. A purified seed stock was prepared and is recommended for use in the preparation of a new lot of reference seed. Eighteen additional ampuled reference seeds for certification were received. These are coxsackieviruses A2, 8, 10, 11, 12, 13, 16, 20a, and echovirus 21 (propagated in human amnion cells) and echovirused 9, 13, 15, 26, and 29 (propagated in monkey kidney). (Author)

PB-170 683 **Field 6M, 6E**
CFSTI Prices: HC$1.00 MF$0.50
Communicable Disease Center, Atlanta, Ga. Viral Reagents Unit.
PRODUCTION OF BWAMBA VIRUS REAGENTS.
Progress rept. for 1 Dec 65-1 Mar 66,
by Matthew A. Bucca. 11 Mar 66, 22p
Contract PH-3905-5

Descriptors: (*Viruses, Immune serums), (*Immune serums, Preparation), Antigens + antibodies, Freezing, Stability, Viability, Immunity, Vaccines, Test methods, Body fluids, Mice.

Identifiers: Bwamba virus.

A comprehensive report covering the production of Bwamba virus reagents is given. Experimental studies including pilot studies on ascitic fluid (AsF) production, the stability of frozen versus lyophilized hyperimmune ascitic fluids, feasibility of ascitic fluid filtration, and attempts at the production of immune Bwamba serum in a large animal are discussed.

PB-170 684 **Field 6M, 6E**
CFSTI Prices: HC$1.00 MF$0.50
Kansas Univ., Kansas City. Medical Center.
PREPARATION AND DEVELOPMENT OF VIRAL REAGENTS.
Semi-annual contract progress rept., 1 Sep 65-1 Mar 66,
by Herbert A. Wenner. 1 Mar 66, 25p
Grant PH-43-64-529

Descriptors: (*Viruses, Immune serums), (*Immune serums, Viruses), Enteroviruses, Adenoviruses, Coxsackie virus, Antigens + antibodies, Purification, Serodiagnosis, Packaging, Tests, Equines.

Identifiers: Simian viruses, Picornaviruses, Rhinoviruses, Reoviruses.

Toluca-3, designated echovirus type 33: Master seed virus and agent virus stocks were formed, and certified by serum 'breakthrough' test. Four liters of type-specific antisera were prepared. This serum is type-specific and virtually non-reactive with known entero-, reo-, adeno- and several rhinoviruses. Eight candidate enteroviruses are under study. The data indicate Chu-37 to be a new serotype, preliminary data indicate that Berlan and Hu-39 are also new serotypes. Studies on the serological relationships of the remaining 5 strains to other picornaviruses are in progress. Twenty-seven rhinovirus serotypes were 'purified'. Virus stocks were prepared for 20; these were titrated and their specificities ascertained. The 7 remaining serotypes are in preparation. Studies on the antigenic heterogeneity of echovirus type 30 were completed. No antigenic relationship was demonstrated between several simian and coxsackieviruses. Summary data is provided relating to: (a) Virus stocks and antisera for 8 simian viruses; (b) preparation, certification and packaging of virus pools for Research Reference Reagents Branch (RRRB), National Institutes of Health. (Author)

AD-634 124 **See Field 6E**

AD-634 152 **See Field 6C**

AD-634 157 **See Field 6E**

AD-634 374 **See Field 6T**

AD-634 549 **See Field 6A**

AD-634 660 **See Field 6E**

PB-169 209 **See Field 6E**

6N. PERSONNEL SELECTION AND MAINTENANCE (MEDICAL)

AD-634 612 **Field 6N, 5I**
CFSTI Prices: HC$1.00 MF$0.50
Naval Aerospace Medical Inst., Pensacola, Fla.
THE THOUSAND AVIATOR STUDY: SMOKING HISTORY CORRELATES OF SELECTED PHYSIOLOGICAL, BIOCHEMICAL, AND ANTHROPOMETRIC MEASURES,
by Norman E. Lane, Albert Oberman, Robert E. Mitchell, and Ashton Graybiel. 27 Apr 66, 17p
NAMI-961
NASA order-R-136
NAVMED-MF022.03.02-5007.11
See also AD-625 854, AD-631 554.

Descriptors: (*Medical examination, Naval personnel), (*Naval personnel, Selection), (*Aviation personnel, Selection), Psychometrics, Anthropometry, Tobacco, Physiology, Biochemistry, Aviation medicine, Cardiography, Lipids, Embolism, Lungs, Blood pressure.

Identifiers: Smoking, Cigarettes.

The Pensacola Thousand Aviator Study began in 1940 with the examinations of 1056 student aviators and flight instructors on a variety of physiological, psychological, and socio-economic parameters. Follow-up examinations on the group were conducted in 1951, 1957, and 1963. During the 1963 follow-up, smoking history information on 675 subjects was obtained by questionnaire and confirmed by interview, together with concurrent data from clinical examinations, laboratory tests, anthropometry, and personal history variables. Two smoking variables were created, Cigarette Amount (CA) and Cigarette Years (CY), each on a scale of 1 to 5 points. From the concurrent data, 62 variables were selected for relevance and general interest to be examined in relation to smoking. Twenty-four of the 62 variables had significant correlations ($p < .05$) with CA, and 16 showed significant relationships to CY. Findings are related briefly to previous research, and problems of cause-effect isolation are mentioned. It is concluded that results in general support previous findings on smoker-nonsmoker differences. Contributions of the study in delineating areas of research for longitudinal investigation are discussed. (Author)

PB-169 870 **Field 6N, 5I**
CFSTI Prices: HC$2.60 MF$0.50
Civil Aeromedical Research Inst., Oklahoma City, Okla.
ANTHROPOMETRY OF AIR TRAFFIC CONTROL TRAINEES,
by Clyde C. Snow, and Richard G. Snyder. Sep 65, 26p
AM-65-26

Descriptors: (*Air traffic controllers, Anthropometry), (*Anthropometry, Statistical analysis), Measurement, Analysis of variance, Students, Aviation medicine, Aging (Physiology), Training, Human engineering.

The report presents the body measurements of 684 air traffic control trainees enrolled in training programs conducted at the Federal Aviation Agency Aeronautical Center at Oklahoma City between August 12, 1960, and June 30, 1961. It includes the means, standard deviations, coefficients of variation, percentiles, and related statistics of 60 standard anthropometric and functional measurements. The survey was initiated to provide adequate criteria for improving the workspace design for the air traffic controller and to provide anthropometric baseline data for future biometric and aging studies of Air Traffic Service personnel. (Author)

AD-634 266 **See Field 6S**

AD-634 406 See Field 6S

PB-169 222 See Field 5E

6O. PHARMACOLOGY

AD-634 654 **Field 6O, 6T**
CFSTI Prices: HC$1.00 MF$0.50
Edgewood Arsenal, Md. Medical Research Lab.
SOME PHARMACODYNAMIC PROPERTIES OF IRIS MUSCLE,
by Kenneth M. Wilson. Jun 66, 15p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Eye, Pharmacology), Neuromuscular transmission, Autonomic nervous system, Poisonous gases, Nerve impulses, Acetylcholine, Epinephrine, Levarterenol, Cholinesterase, In vivo analysis, Sympathomimetic agents, Adaptation (Physiology), Dosage, Cornea, Retina, Muscles, Toxicity, Atropine, Genetics, Humans, Rats.

The iris can be used (in vivo) as an accurate indicator of drug concentrations reaching it via the cornea and/or peri-limbal vessels. An isolated iris preparation has been devised which can be standardised so that its response to a variety of drugs is highly quantitative. Many drugs but especially cholinolytic agents can be assayed and useful correlations between central and peripheral activities can be shown with the aid of the iris preparation. Fundamental differences in the kinetics of different isomers of the same drug can be identified and to some extent described quantitatively. A consistent and important difference in the reaction to atropine like drugs exists between albino and hooded irises. The difference lies in the competence of the dilator muscle and reflects the different genetic pattern of the two varieties of rat. It is also worth noting that since the unpigmented iris of the albino exerts little control over light flux incident upon the retina, the albino has no real use for a competent dilator. The differences in iris response observed between hooded rats and albino may therefore represent an adaptation to the different level of sensory input. The contractile properties of the sphincter and dilator muscles are pharmacologically distinct but acetylcholine has a direct inhibitory action on the dilator system. (Author)

AD-634 657 **Field 6O, 6T**
CFSTI Prices: HC$1.00 MF$0.50
Edgewood Arsenal, Md. Medical Research Lab.
ACETYLCHOLINESTERASE AND NERVE CONDUCTION,
by Nelson L. Adams, Edmund Bay, and Charles M. Towns. Jun 66, 11p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Acetylcholinesterases, Nerve impulses), (*Neuromuscular transmission, Acetylcholinesterases), Electrophysiology, Enzymes, Inhibition, Nerve fibers, Ganglia, Histological techniques, Organic phosphorus compounds, In vivo analysis, Insecticides, Toxicity, Cats.

An attempt was made to determine the effects of several anticholinesterase compounds on the electrically evoked nerve and muscle action potentials of the cat. It has been shown that nerves essentially devoid of detectable enzyme are able to conduct impulses without any impairment. The characteristic effects produced by these inhibitors at the neuromuscular junction have been observed. The conclusion is reached that in motor nerve fibers there is apparently no correlation between the magnitude and amplitude of the action potential acetylcholinesterase activity as determined in homogenized nerve and histochemically. It appears than, from the data presented here, the only 'biochemical lesion' produced by organophosphorous anticholinesterase compounds and insecticides that need be of concern in therapeutic procedures are located at junctions (neuromuscular, synapses, ganglia, etc.) There are apparently no effects on intra-axonal conduction. (Author)

AD-634 124 See Field 6E

AD-634 653 See Field 6A

PB-170 424 See Field 5B

6P. PHYSIOLOGY

AD-634 271 **Field 6P, 6F, 15E**
CFSTI Prices: HC$1.00 MF$0.50
Clothing and Organic Materials Div., Army Natick Labs., Mass.
THE MET AND THE CLO. PART I. RESTATEMENT OF THE ORIGINAL DEFINITIONS.
Technical rept.,
by David L. Fiske. May 66, 16p MRE-66-2
Proj. DA-60308200
USA-NLABS-TR-66-21-CM

Descriptors: (*Heat production (Biology), Measurement), (*Thermal insulation, Clothing), Metabolism, Heat transfer, Perspiration, Skin, Body temperature.

Identifiers: Met, Clo.

The definitions of the met (50 Kcal/sq. m. hr = 18.5 Btu/sq ft hr) and the clo (5.55 Kcal/sq. m hr deg C = 1.14 Btu/sq. ft hr deg F), as derived from the original paper (1941) by the three physiologists Gagge, Burton, and Bazett, are discussed in terms familiar to heat transfer engineers. The number of the clo required, n, is stated as a function of the temperature, t (in deg F), by the equation: n = 0.0814 (92-t) -0.792. This gives a value of n of 1.0 at t = 70F. (Author)

AD-634 344 **Field 6P, 5J**
CFSTI Prices: HC$4.00 MF$0.75
TRACOR, Inc., Austin, Tex.
STUDIES OF BINAURAL INTERACTION.
Summary rept., 1 Apr 65-31 Mar 66,
by Bruce H. Deatherage. 31 Mar 66, 127p
TRACOR-66-311-U
Contract Nonr-4193 (00)

Descriptors: (*Hearing, Psychophysiology), Auditory perception, Frequency, Ear, Anatomical models, Sound.

Identifiers: Binaural phenomena.

Experiments with dimensional models of the cochlea, and studies of auditory localization showed that tone bursts and impulsive stimuli (clicks) are processed differently by the auditory system. The purpose of these experiments was to examine this difference as a function of frequency coding in the ear.

AD-634 554 **Field 6P**
Sao Paulo Univ. (Brazil). School of Medicine of Ribeirao Preto.
EFFECTS OF STIMULATION OF THE CEREBELLAR CORTEX ON SPINAL MONOSYNAPTIC REFLEXES,
by C. Timo-Iaria, and J. J. O'Flaherty. 1964, 13p
Grants AF-AFOSR-61-60, AF-AFOSR-62-335
AFOSR-66-0989

Descriptors: (*Cerebellum, *Motor reactions), Electrophysiology, Stimulation, Spinal cord, Reflexes, Nerve cells, Nerve impulses, Neuromuscular transmission, Extremities, Muscles, Nerves, Cats, Brazil.

Electrical stimulation of the cerebellar cortex with single pulses preceding the monosynaptic extensor reflex evoked from afferents of the gastrocnemius branches and tibialis nerve, was performed in lightly anesthetized cats. By plotting the effects of the conditioning pulses on the reflex potentials as a function of time, the following patterns were disclosed: (a) From many loci it was possible to stabilize previously oscillating reflex potentials. (b) In several cases the evoked effect was reduced after the first or second stimuli. (c) Inhibition arose from the ipsilateral vermian and contralateral paravermian zones, from ipsilateral crus II and contralateral crus I, from ipsilateral paramedian lobule, and from the ipsilateral dorsal and contralateral ventral paraflocculi. Facilitation was provoked from the symmetric corresponding areas. (d) These influences lasted over 100 msec in most curves but were generally weak. (e) Reciprocal innervation was a definite pattern of such effects. (Author)

AD-634 555 **Field 6P**
Laval Univ., Quebec. Laboratoires d' Endocrinologie.
SYNTHESE ET LIBERATION D'ACTH A LA SUITE D'UNE AGRESSION AIGUE CHEZ LE RAT SURRENALECTOMISE (Acth Release and Synthesis in the Acutely Stressed Adrenalectomized Rat),
by P. Ducommun, S. Ducommun, M. Jobin, J. Kraicer, and P. Mialhe. Dec 64, 5p
Grant AF-AFOSR-511-64
Proj. AF-9777
Task 977701
AFOSR-66-0960
Text in French; Attached Summary in English.

Descriptors: (*Adrenocorticotropic hormone, Biosynthesis), Adrenal glands, Excision, Stress (Physiology), Pituitary hormones, Blood analysis, Inhibition, Rats, Canada.

Laparotomy under ether anesthesia in the adrenalectomised female rat resulted in a transient increase in blood ACTH, reaching its peak after 5 min and returning to normal within 20 min. Contrary to recent findings by Vernikos-Danellis, no increase in pituitary ACTH could be detected in the first 10 postoperative minutes. This militates against the theory of the predominance of ACTH synthesis under the effects of stress. The subsequent fall in pituitary ACTH observed concurrently with the continuing fall in blood ACTH is ascribed to the fact that ACTH synthesis is more markedly inhibited than ACTH release at this later stage of stress response. (Author)

AD-634 582 **Field 6P**
Pennsylvania Univ., Philadelphia. Dept. of Physiology.
PHYSIOLOGY AND CHEMISTRY OF HYPOTHALAMIC FACTORS WHICH INFLUENCE GONADOTROPHIN SECRETION,
by S. M. McCann, J. Antunes-Rodrigues, and A. P. S. Dhariwal. 1965, 10p
Grants AF-AFOSR-62-133, PHS-AM-01236-09
Proj. AF-9777
Task 977701
AFOSR-66-0994

Descriptors: (*Sex hormones, Secretion), Thalamus, Stimulation, Biological assay, Pituitary hormones, Blood analysis, Inhibition, Cerebral cortex, Chromatographic analysis, Peptides, Estrogens, Testosterone, Dosage, Rats.

Identifiers: Luteinizing hormone, Follicle stimulating hormone.

Crude acidic hypothalamic extracts from rat, beef, or sheet are active in releasing LH (ovarian ascorbic acid assay) and FSH (mouse uterine weight augmentation or rat ovarian weight augmentation assays). These extracts are also capable of inhibiting the nursing-induced decline in pituitary prolac-

tin stores. The LH-RF can elevate plasma LH in a variety of situations. Both the FSH-RF and LH-RF are active in ovariectomized rats in which the release of FSH and LH have been inhibited either by administration of both estrogen and progesterone, or by hypothalamic lesions which eliminate neural control of gonadotrophin secretion. This latter observation suggests that these two factors act directly on the pituitary to discharge gonadotrophins. Cerebral cortical extracts are incapable of affecting gonadotrophin secretion and the LH-RF has been shown to be localized in the SME region. The FSH-RF, LH-RF and PIF are relatively heat stable on comparison with the heat lability of LH. LH-RF is inactivated by peptic or tryptic digestion, but is not affected by thioglycollate which inactivates vasopressin and oxytocin. Gel filtration on Sephadex G-25 has separated the FSH-RF from the LH-RF and from CRF and growth hormone-releasing factor. The LH-RF has been obtained in a highly purified state after further chromatography on CMC. The gonadotrophin-releasing factors appear to be small, basic polypeptides dissimilar from vasopressin and oxytocin. (Author)

AD-634 636 **Field 6P, 6A**
CFSTI Prices: HC$1.00 MF$0.50
Edgewood Arsenal, Md. Medical Research Lab.
REGULATION OF METABOLISM, IN VIVO,
by Bertram Sacktor, and E. Wormser-Shavit. Jun 66, 11p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Metabolism, In vivo analysis), Biochemistry, Glycogen, Glycolysis, Amino acids, Phosphates, Nucleotides, Saccharide phosphates, Phosphorylation, Oxidation, Stress (Physiology), Tissues (Biology), Diptera, Flight, Insects.

Identifiers: Metabolites.

The concentrations of 35 critical metabolites, including glycogen, trehalose, components of the glycolytic pathway and citric acid cycle, amino acids, phosphates, and adenine nucleotides in flight muscle of the flowfly, Phormia, were measured concurrently after periods of flight ranging from 5 sec. to 1 hr. Coincbdent changes in metabolites concomitant with the 100-fold increase in glycolytic flux attained on initiation of flight provided an unique system to determine the steps that control glycolysis in vivo, in the transition from a tissue at rest to one performing strenuous work. Three sites of regulation: the phosphorylation of fructose-6-phosphate; the cleavage of trehalose; and the phosphorolysis of glycogen were established in this system in vivo. Additional controls at the oxidations of alpha-glycerophosphate and of proline are suggested. (Author)

PB-169 871 **Field 6P, 6E**
CFSTI Prices: HC$1.10 MF$0.50
Civil Aeromedical Research Inst., Oklahoma City, Okla.
INTRARENAL HEMODYNAMIC CHANGES FOLLOWING ACUTE PARTIAL RENAL ARTERIAL OCCLUSION,
by Charles M. Brake, Dale Reins, Lorenz E. Wittmers, and Lerner B. Hinshaw. Oct 65, 6p
AM-65-27
Prepared in cooperation with Oklahoma Univ., Oklahoma City. School of Medicine. Sponsored in part by the American Heart Association and Tulsa County (Oklahoma) Heart Association.

Descriptors: (*Arteries, Obstruction (Physiology)), (*Kidneys, Arteries), Blood pressure, Blood circulation.

Identifiers: Renal arteries.

Both an increase and a decrease in total renal vascular resistance, following a period of total renal artery occlusion, were previously reported. The duration of the occlusive period and the height of the perfusion pressure were found to prescribe consistently the hemodynamic response. The present study was undertaken to determine if a similar renal vascular response occurred after a period of partial renal artery occlusion. Results indicate that following a period of partial occlusion, in a critical range of renal artery pressure, intrarenal hemodynamic changes mimicked those seen after total obstruction of blood flow. Reactive hyperemia was not observed. (Author)

AD-447 126 **See Field 6Q**

AD-634 266 **See Field 6S**

AD-634 289 **See Field 6D**

AD-634 457 **See Field 6J**

AD-634 643 **See Field 6E**

AD-634 652 **See Field 6T**

AD-634 690 **See Field 6U**

PB-169 208 **See Field 6A**

6Q. PROTECTIVE EQUIPMENT

AD-447 126 **Field 6Q, 6P**
CFSTI Price: HC$7.60
Edgerton Germeshausen and Grier Inc., Boston, Mass.
DEVELOPMENT OF FLASHBLINDNESS PROTECTIVE GOGGLES.
Final rept.,
by F. E. Barstow. Sep 61, 79p EG/G-B-2288
Contract AF 41 (657)-315

Descriptors: (*Flashblindness, Eyeglasses), (*Eyeglasses, Flashblindness), (*Eye, Protective coverings), Nuclear explosions, Brightness, Optical filters, Retina, Burns, Design, Aviation medicine, Density, Photochromism, Materials, Helmets.

For abstract, see T 66 15.

AD-634 720 **See Field 15E**

6R. RADIOBIOLOGY

ACRH-24 **Field 6R**
CFSTI Prices: HC$5.00 MF$1.00
Argonne Cancer Research Hospital, Chicago, Ill.
SEMIANNUAL REPORT TO THE ATOMIC ENERGY COMMISSION,
by Leon O. Jacobson, and Margot Doyle. Sep 65, 195p
Contract AT (11-1)-69

Descriptors: (*Cancer, Medical research), (*Radiobiology, Public health).

AD-634 405 **Field 6R**
CFSTI Prices: HC$1.00 MF$0.50
Battelle Memorial Inst., Columbus, Ohio.
EFFECTS OF RADIATION ON THE SUBMICROSCOPIC STRUCTURE OF THE SYMPATHETIC NEURON.
Final rept. 16 Mar 62-15 Jul 64,
by Richard M. Roppel, Carl W. Melton, Arthur C. Peters, Wayne H. Allton, and John E. Prince.
Apr 66, 17p
Contract AF 41 (609)-1585
Proj. AF-7757
Task 775702
SAM-TR-66-32

Descriptors: (*Nerve cells, Radiation effects), (*Autonomic nervous system, Radiation effects), Cell structure, Ganglia, Hamsters, Dosage, Electron microscopy, Tissues (Biology), Gamma rays, Morphology (Biology).

Hamsters were irradiated with supralethal, single doses and with sublethal, fractionated doses of Co60 gamma radiation. Autonomic ganglia were dissected from these animals at various times after irradiation and were studied by electron microscopy for evidence of morphologic change resulting from irradiation. When fixation was accomplished by direct immersion of tissues in permanganate solution, only minimal cellular changes that could be attributed to radiation were observed in sympathetic tissues following single massive doses of 10,000 to 100,000 r. When perfusion fixation was attempted, however, extensive fixation artifact was observed in the tissues of irradiated animals but not in controls. Fractionated-dose irradiation to a total of 500 r administered as ten 50 r doses resulted in an increase in the number of densely staining, cytoplasmic inclusion bodies observed in sympathetic neurons. A permanganate-sodium plumbate staining procedure which results in an electron microscope image of high contrast is described. (Author)

AD-634 608 **Field 6R, 22A, 3B**
CFSTI Prices: HC$1.00 MF$0.50
Naval Aerospace Medical Inst., Pensacola, Fla.
A NOTE ON THE DOSIMETRIC INTERPRETATION OF RIGIDITY SPECTRA FOR SOLAR PARTICLE BEAMS,
by Hermann J. Schaefer. 26 Apr 66, 17p NAMI-960
NASA Order-75
NAVMED-MF022.03.02-5001.34

Descriptors: (*Radiological dosage, Solar radiation), (*Solar flares, Radiation hazards), Alpha particles, Protons, Dose rate, Shielding, Astronauts, Space medicine.

By using the experimental rigidity formulation as proposed by Freier and Webber, the particle fluxes of all flare events of the past solar cycle can be uniformly described in terms of a flux constant J sub o and a rigidity constant P sub o. On the basis of these data, three fictitious rigidity spectra are 'synthesized' covering the full variability range of all flare events, yet characterizing more systematically the relationships between the basic dosimetric quantities and the rigidity constant P sub o. It is found that, of the components heavier than protons, only alpha particles contribute substantially to total exposure. The fractional alpha dose in the tissue surface behind 0.1 g/sq cm shielding grows from 40 percent for P sub o = 50 Mv to 400 per cent for P sub o = 300 Mv. At the same time, the depth dose of the alpha component shows an extremely steep drop which would require microsensors for accurate measurement. For the alpha and medium heavy components, the RBE shows a pronounced transition in near surface regions which further steepens the drop of the RBE dose equivalents as compared to the rad doses. The extremely strong and nonlinear dependence of the rad and rem dose distribution on rigidity makes the rigidity concept practically useless for any dosimetric evaluation and indicates the need for direct measurements of local rad and rem doses on the astronaut's body. (Author)

ANL-7060 **Field 6R, 5B**
CFSTI Prices: HC$4.00 MF$1.00
Argonne National Lab., Ill.
RADIOLOGICAL PHYSICS DIVISION ANNUAL REPORT, JULY 1964-JUNE 1965.
Jun 65, 140p
Contract W-31-109-eng-38

Descriptors: (*Radiobiology, Bibliographies).

For abstract, see N 20 13.

ANL-7139 **Field 6R, 20G, 18F**
CFSTI Prices: HC$1.00 MF$0.50
Argonne National Lab., Ill.
EXPERIMENTAL SHIELDING STUDY OF THE ARGONNE 12.5-MEV TANDEM VAN DE GRAAFF INSTALLATION,

by N. C. Dyer, and R. L. Mundis. Jan 66, 9p
Contract W-31-109-eng-38

Descriptors: (*Shielding, Particle accelerators), (*Particle accelerators, Shielding).

For abstract, see N 20 13.

CEX-65.03 **Field 6R**
CFSTI Prices: HC$1.00 MF$0.50
Oak Ridge National Lab., Tenn.
OPERATIONS PLAN - OPERATION HENRE.
by F. F. Haywood, T. G. Provenzano, and J. A. Auxier. Jun 65, 48p
Contract W-7405-eng-26

Descriptors: (*Reactor system components, Reactor operation), (*Research reactors, Fission neutrons).

LA-3397 **Field 6R, 18D, 18H**
CFSTI Prices: HC$3.00 MF$0.75
Los Alamos Scientific Lab., Univ. of California, N. Mex.
RADIATION MEASUREMENTS OF THE EFFLUENT FROM THE KIWI B4D-202 AND B4E-301 REACTORS,
by R. W. Henderson, and R. V. Fultyn. 12 Aug 65, 88p
Contract W-7405-eng-36

Descriptors: (*Radioactivity, Radiation measurement systems), (*Radiation measurement systems, Health physics).

LA-3451 **Field 6R, 21B**
CFSTI Prices: HC$2.00 MF$0.50
Los Alamos Scientific Lab., Univ. of California, N. Mex.
BURN INVESTIGATIONS OF SOME COAXIAL CABLES,
by F. M. Jackson, and R. E. Stapleton. 27 Dec 65, 36p
Contract W-7405-eng-36

Descriptors: (*Coaxial cables, Flame propagation), (*Burning rate, Coaxial cables).

NYO-2181-3 **Field 6R**
CFSTI Prices: HC$4.00 MF$1.00
New Jersey State Dept. of Health, West Orange. Radium Research Project.
EPIDEMIOLOGICAL FOLLOWUP OF THE NEW JERSEY RADIUM CASES. I. REPORT OF THE EPIDEMIOLOGICAL AND MEDICAL STUDY GROUP AND THE PROJECT SUBCONTRACTORS. II. RESUME OF COOPERATIVE LABORATORY STUDIES ON PROJECT CASES AND SPECIMENS. III. RESUMES OF FINDINGS FROM INDIVIDUAL CASE STUDIES.
Progress rept. for 1 Sep 65.
15 Feb 66, 136p
Contract AT (30-1)-2181

Descriptors: (*Health physics, New Jersey), (*Radium, Radiobiology).

For abstract, see N 20 12.

N66-15240 **Field 6R**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
THE IONIZING RADIATIONS IN SUPERSONIC TRANSPORT FLIGHTS,
by T. Foelsche. 1964, 23p NASA-TM-X-56135
Presented at the Symp. on Protect. against Radiation in Space (2nd), Gatlinburg, Tenn., Oct 12-14 1964.

Descriptors: *Cosmic radiation, *Passenger, *Supersonic commercial air transport /scat/, *Aircrew, *Radiation dose.

ORO-635 **Field 6R, 2E, 6C**
CFSTI Prices: HC$5.00 MF$1.00
UT-AEC Agricultural Research Lab., Oak Ridge, Tenn.
SEMIANNUAL PROGRESS REPORT ON AGRICULTURAL RESEARCH, JANUARY 1-JUNE 30, 1965.
30 Dec 65, 161p
Contract AT (40-1)-GEN-242

Descriptors: (*Agriculture, Radiobiology), (*Radiobiology, Agriculture).

SC-RR-65-491 **Field 6R, 14B, 4A, 18D**
CFSTI Prices: HC$2.00 MF$0.50
Sandia Corp., Albuquerque, N. Mex.
PROJECT SAND FINAL PROGRAM REPORT. VOLUME II. SAND FILTER-SAMPLER ANALYSIS, DEVELOPMENT, AND TESTING,
by R. M. Elrick, and D. J. Rigali. Apr 66, 46p
Contract AT (29-1)-789

Descriptors: (*Upper atmosphere, Instrumentation), (*Filters (Fluid), Upper atmosphere).

Identifiers: Sand.

For abstract, see N 20 13.

TID-4204 **Field 6R**
CFSTI Prices: HC$5.50 MF$2.25
Division of Biology and Medicine (AEC), Washington, D. C.
RESEARCH AND DEVELOPMENT IN PROGRESS - BIOLOGY AND MEDICINE. ISSUE NO. 4.
Apr 66, 229p

Descriptors: (*Radiobiology, Medical research), (*Medical research, Health physics).

For abstract, see N 20 13.

UCRL-14534 **Field 6R, 18H, 18D**
CFSTI Prices: HC$3.00 MF$0.75
California Univ., Livermore. Lawrence Radiation Lab.
HAZARDS CONTROL QUARTERLY REPORT NO. 22, JULY-SEPTEMBER 1965.
Sep 65, 60p
Contract W-7405-eng-48

Descriptors: (*Reactor hazards, Health physics instrumentation), (*Reactor control, Health physics).

UCRL-14739 **Field 6R**
CFSTI Prices: HC$5.00 MF$1.00
California Univ., Livermore. Lawrence Radiation Lab.
PROGRAM BOOK FOR THE ADVISORY COMMITTEE FOR BIOLOGY AND MEDICINE OF THE UNITED STATES ATOMIC ENERGY COMMISSION. PART II.
10 Mar 66, 177p
Contract W-7405-eng-48

Descriptors: (*Radiobiology, Radiological dosage), (*Health physics, Radioactivity).

UCRL-16613 **Field 6R, 18D**
CFSTI Prices: HC$4.00 MF$0.75
Lawrence Radiation Lab., Univ. of California, Berkeley.
BIOLOGY AND MEDICINE SEMIANNUAL REPORT, FALL 1965,
by John H. Lawrence. 1965, 109p
Contract W-7405-eng-48
Prepared in cooperation with Donner Lab. and Donner Pavilion.

Descriptors: (*Aviation medicine, Radiobiology), (*Health physics, Medical research).

Y-1501 **Field 6R**
CFSTI Prices: HC$1.00 MF$0.50
Union Carbide Corp., Oak Ridge, Tenn. Y-12 Plant.
AUTOMATED AIR SAMPLING BY THE USE OF APERTURE CARDS,
by Merwyn Sanders. 3 Mar 66, 13p
Contract W-7405-eng-26

Descriptors: (*Health physics instrumentation, Air pollution), (*Air pollution, Punched cards).

AD-634 670 **See Field 6E**

BNWL-113-12 **See Field 7E**

BNWL-113-13 **See Field 7E**

BNWL-36 **See Field 7E**

HASL-165 **See Field 18H**

IDO-12047 **See Field 18H**

LA-1981 **See Field 18H**

LA-3432 **See Field 18H**

LA-3446 **See Field 18D**

ORNL-3900 **See Field 7E**

ORNL-3918 **See Field 13I**

UCRL-14702 **See Field 18H**

6S. STRESS PHYSIOLOGY

AD-449 479 **Field 6S**
CFSTI Price: HC$2.60
Ohio State Univ. Research Foundation, Columbus.
VISUAL RECOVERY FROM BRIEF EXPOSURES TO VERY HIGH LUMINANCE LEVELS.
Technical documentary rept.,
by Glenn A. Fry, and Norma D. Miller. Aug 64, 30p
Contract AF 33 (657)-9229
Proj. 6301
Task 630103
SAM-TDR-64-36

Descriptors: (*Visual perception, Adaptation (Physiology)), (*Adaptation (Physiology), Light), Recovery, Exposure, Illumination.

The design and calibration of the apparatus for delivering brief, high-intensity flashes from a xenon-filled flash tube are described. A maximum field luminance of 4.4 x 10 to the 5th power L. was provided by the flash tube seen by Maxwellian view. A rotating mirror was synchronized with the flash tube discharge to produce exposure durations from 42 microsec. to 1.4 msec. Field sizes could be varied from a point source to 10 degrees and an adapting field optical system allowed the subject to be preadapted to various luminance levels before the flash was received. The criterion measure for recovery times following the flash was the correct identification of Sloan-Snellen test letters. Five different letter sizes were provided subtending visual angles from 41.9 to 10.2 minutes of arc. Some data are reported for five exposure durations of the flash and for five field sizes for the 20.3 minutes of arc test letter at a luminance of 0.066 6 mL. (Author)

AD-634 266 **Field 6S, 6F, 6E, 6G K**
CFSTI Prices: HC$5.00 MF$1.00
Naval Medical School, Bethesda, Md.
POLAR MANUAL. ARCTIC AND ANTARCTIC LIVING CONDITIONS, PERSONNEL SELECTION, HYGIENE AND SANITATION, CLOTHING, NUTRITION, SUPPLIES AND EQUIPMENT, VISUAL DISABILITIES AND COLD INJURIES, FIRST AID, SAFETY, AND SURVIVAL.
Fourth ed.,
by E. E. Hedblom. 30 Apr 65, 172p

Descriptors: (*Polar regions, Handbooks), Ecology, Personnel, Physiology, Hygiene,

Adjustment (Psychology), Heat, Clothing, Nutrition, Sanitary engineering, Transportation, Logistics, Vision, Wounds + injuries, Geography, Medical supplies, Medicine, Survival, Dentistry, Mortality rates, Safety.

For abstract, see T 66 15.

AD-634 406 **Field 6S, 5I, 6N**
CFSTI Prices: HC$1.00 MF$0.50
School of Aerospace Medicine, Brooks AFB, Tex.
RESPONSES TO CORIOLIS STIMULATION IN FLYING PERSONNEL WITH DIFFERENT LEVELS OF PROFICIENCY.
Rept. for Jun-Nov 65,
by Edwin W. Moore. Apr 66, 12p SAM-TR-66-36
Proj. AF-7750
Task 77503

Descriptors: (*Pilots, Adaptation (Physiology)), Performance tests, Aviation medicine, Nystagmus, Training, Vestibular apparatus, Coriolis effect, Stimulation, Astronauts.

The Coriolis test, as part of physical evaluations, was administered to candidates for the Gemini program, candidates for the USAF Research Test Pilot School, a representative cross section of Air Force pilots, and a group of nonflyers. The rates of decay of vertical nystagmic responses for the four groups were compared. A significantly different rate of decay was demonstrated between the groups. A greater amount of flying experience of the space pilot and test pilot groups resulted in a greater degree of habituation than shown by the representative cross section of Air Force pilots. All three groups of pilots demonstrated a significantly greater degree of habituation than the nonflyer group. The possible reasons for the significant differences found are discussed in terms of the stimuli presented and the habituation derived from flying experience. (Author)

AD-634 519 **Field 6S**
CFSTI Prices: HC$1.00 MF$0.50
Naval Air Development Center, Johnsville, Pa. Aerospace Medical Research Dept.
CATECHOL AMINE MEASUREMENTS ASSOCIATED WITH AUTONOMIC-LABYRINTHINE RESPONSES IN MAN EXPOSED TO POSITIVE (+Gz) ACCELERATION.
Final rept.,
by Elihu York, Kenneth R. Brown, and Alan Goldfien.13 Apr 66, 18p NADC-MR-6602
NAVMED-MR005.13-0002.19-2

Descriptors: (*Acceleration tolerance, *Amines), (*Epinephrine, Excretion), Motion sickness, Vestibular apparatus, Stress (Physiology), Blood plasma, Urine, Measurement.

Identifiers: Catecholamines.

Five normal subjects and two labyrinthine-defective subjects were exposed to acceleration profiles consisting of linear, angular and combined (linear plus angular) stress. Catechol amines were measured in plasma and urine for both groups. A demonstrated rise in plasma nor-epinephrine occurred in two of the five normal subjects, both of whom developed motion sickness following a 'combined' acceleration stress. The normal group had measurable plasma epinephrine levels, under most circumstances, whereas the labyrinthine defective group had none. Although there is insufficient data to make a clear-cut separation between different types of acceleration stress in the two groups, and their associated biochemical responses; nevertheless, there is some evidence to suggest that the intact labyrinth is a factor influencing elaboration of catechol amines, which in turn may be implicated in the development of motion sickness. (Author)

AD-634 609 **Field 6S**
CFSTI Prices: HC$1.00 MF$0.50
Naval Aerospace Medical Inst., Pensacola, Fla.
BIOCHEMICAL CHANGES OCCURRING WITH ADAPTATION TO ACCELERATIVE FORCES DURING ROTATION,
by James K. Colehour, and Ashton Graybiel. 25 Apr 66, 15p NAMI-959
NASA Order-R-93
NAVMED-MR005.13-0004.2.3

Descriptors: (*Motion sickness, Biochemistry), (*Adaptation (Physiology), Biochemistry), (*Acceleration tolerance, Biochemistry), Rotation, Stress (Physiology), Excretion, Corticosteroid agents, Eosinophils, Hyperventilation, Levarterenol, Excretion, Confined environments.

Identifiers: Eosinopenia, Hypercalciuria, Hypercapnia, Recumbency effects.

Four young men lived in a continually rotating room, 15 feet in diameter, for a period of six days. Rotational velocities on succeeding days were: 6.4, 6.4, 8.6, 10.0, 6.4, and 3.2 RPM. Stress effects measured as increased excretion rates of 17, 21 dihydroxypregnane-20-ones, eosinopenia, hyperventilation, and nausea were observed on the first day of rotation. However, adaptation was rapid, and no further stress effects were observed even with increased rotational velocity. Mild degrees of hypercalciuria, hypercapnia, and decreased norepinephrine excretion rates were observed during the last four days of the experiment as a result of the increased time spent in recumbency. (Author)

AD-634 632 **Field 6S**
CFSTI Prices: HC$1.00 MF$0.50
Army Tank-Automotive Center, Warren, Mich.
THEORY OF HUMAN VIBRATION RESPONSE,
by Fred Pradko, Richard Lee, and Victor Kaluza. Jun 66, 14p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Stress (Physiology), *Vibration), Humans, Theory, Measurement, Absorption (Biological), Tolerances (Physiology), Acceleration.

The paper discusses whole body human response to mechanical vibration. The theoretical considerations are based on the view that man's response in a vibratory environment can be determined through measurement of input conditions only. Separation of the total problem (anatomical, psychological, and physiological) into this narrow premise has produced a new parameter identified as 'absorbed power.'

AD-634 647 **Field 6S**
CFSTI Prices: HC$1.00 MF$0.50
Army Medical Research and Nutritional Lab., Denver, Colo.
HEMODYNAMIC ALTERATIONS IN HUMANS AND ANIMALS DURING CHRONIC HIGH ALTITUDE EXPOSURE,
by James A. Vogel, James E. Hansen, and John P. Hannon.Jun 66, 14p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*High altitude, Adaptation (Physiology)), (*Cardiovascular system, High altitude), (*Hypoxia, Cardiovascular system), Stress (Physiology), Blood volume, Blood pressure, Blood circulation, Blood vessels, Pulse rate, Metabolism, Pressure breathing, Heart, Lungs, Edema, Exercise, Humans, Dogs.

Identifiers: Mountain sickness.

It is concluded from these studies that the heart and circulation are capable of meeting the demands of oxygen delivery during heavy work at altitudes up to 14,000 ft. There was no evidence of any deleterious effect on the circulatory system nor of any reduced efficiency in the heart's action. Even though maximum performance is reduced at this elevation, it does not appear that the heart and circulation are responsible. Lastly, it can be recommended that gradual ascent to high elevation will be definitely advantageous from the standpoint of the cardiovascular system since it will significantly reduce the work load imposed upon the heart, particularly during the early stages of acclimatization when other problems such as pulmonary edema and altitude sickness are most apt to be prominent.

PB-169 829 **Field 6S, 6E**
CFSTI Price: HC$3.60
School of Aviation Medicine, Randolph AFB, Tex.
HIGH ALTITUDE HYPOXIA OBSERVATIONS IN SEVENTY-FIVE FATAL CASES AND ANALYSIS OF THE CAUSES OF THE HYPOXIA,
by Robert B. Lewis, and Webb Haymaker. Apr 48, 38p Rept. no. 1
Proj. 513
AD-121 706

Descriptors: (*Hypoxia, Etiology), High altitude, Aviation medicine, Pathology, Cell structure, Nerves, Brain.

An analysis of 75 deaths due to hypoxia at high altitude during World War II, includes the history of the flights, causes of the hypoxic accidents, and the pathologic changes which occurred. The outstanding pathologic changes were (1) engorgement of systemic veins and marked passive congestion, edema, and hemorrhage of the internal organs, (2) vacuolar changes with or without inclusions in cells of internal organs, especially the heart and liver, and (3) reactive changes in leptomeningeal histiocytes, extravasation of lymphocytes into perivascular spaces of the brain, and acute ganglion cell changes in the brain. (Author)

AD-430 655 **See Field 6C**

AD-634 456 **See Field 6J**

AD-634 643 **See Field 6E**

AD-634 660 **See Field 6E**

6T. TOXICOLOGY

AD-634 374 **Field 6T, 6M, 6E**
CFSTI Prices: HC$1.00 MF$0.50
Albany Medical Coll., N. Y. Inst. of Experimental Pathology and Toxicology.
ANNUAL REPORT (2nd), MARCH 23, 1966,
by Frederick Coulston. 1966, 19p
Contract DA-18-035-AMC-124 (A)

Descriptors: (*Toxins + antitoxins, Biological assay), Absorption (Biological), Tissues (Biology), Blood, Body fluids, Erythrocytes, Gastrointestinal system, Toxicity, Dosage, Chromatographic analysis, Clostridium botulinum, Corynebacterium, Clostridium tetani, Immune serums, Mortality rates, Muscles, Rats.

Following intravenous administration of toxin to albino rats, there appeared to be a reduction in the concentration of toxin within the blood within four hours. Analyses of the gross components of the blood have indicated that the toxin is carried in the fluid portion of the blood. Some toxin may be adsorbed on the surface of the red blood cell, but does not penetrate it, and can be eluted from the surface with saline. Clotting did not remove the toxin from the serum. When large oral doses of crude toxin were given to rats, there was apparently very little absorption from the gastrointestinal tract. Assays of plasma in mice at times up to four

hours after oral administration were generally negative, although the contents of the gastrointestinal tract remained lethal to mice. In spite of the apparent poor absorption, there was indication of accumulation of toxin in the kidneys. Following intraperitoneal injection of the toxin into rats, the mouse assay of the plasma became positive within 30 minutes. The contents of the gastrointestinal tract also became lethal within 30 minutes. There was apparent reduction in the blood level of the toxin within four hours and accumulation of the toxin by the kidneys. (Author)

AD-634 646 **Field 6T**
CFSTI Prices: HC$1.00 MF$0.50
Edgewood Arsenal, Md. Medical Research Lab.
ISOLATION AND IDENTIFICATION OF TOXIC FRACTIONS OF COBRA VENOM,
by James A. Vick, Henry P. Ciuchta, Clarence Broomfield, Byron T. Currie, and James H. Manthei. Jun 66, 7p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Venoms, Toxicity), Reptiles, Electrophysiology, Electroencephalography, Electrocardiography, Cardiovascular system, Neuromuscular transmission, Sympatholytic agents, Acetylcholine, Toxins + antitoxins, Paralysis, Phospholipids, Enzymes, Brain, Dosage, Chromatographic analysis, Dogs.

The results of this study indicated that six physiologically active fractions can be separated from crude cobra venom by fractionization procedures. The administration of the first fraction produced a marked depression of the cortical electrical activity. It has been shown that crude cobra venom contains large amounts of phospholipase A. Although it has not been established at the present time it is felt that the change in EEG may not be the result of phospholipase A activity. Fractions 5-8, which may produce respiratory paralysis by blocking neuromuscular transmission at the diaphragm, appeared to do so by interfering with some action of acetylcholine. There are, however, others who indicated that this phenomenon may be the result of increased nerve membrane permeability. This concept is consistent with a proposed general breakdown of membrane phospholipid by venom, producing an over all depolarization and block rather than any specific inhibition. The effect of fraction 12 on arterial blood pressure and heart rate indicated that cobra venom has a definite action on the cardiovascular system of the dog.

AD-634 652 **Field 6T, 6P**
CFSTI Prices: HC$1.00 MF$0.50
Walter Reed Army Inst. of Research, Washington, D. C.
BLOOD COAGULATION FACTOR ACTIVITY IN ENDOTOXEMIA,
by Robert L. West, Paul B. Jennings, and Robert M. Hardway. Jun 66, 11p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Blood coagulation, *Toxins + antitoxins), Bacteria, Blood, Prothrombin, Fibrinogen, Proteins, Blood platelets, Anticoagulants, Fibrin, Dogs.

Identifiers: Thromboplastin.

Twelve dogs were subjected to endotoxemia and the activity of coagulation factors was studied quantitatively. Coagulation studies were performed on the dogs' normal plasma and on plasmas collected 5 minutes and 4 hours after endotoxin administration. All dogs had coagulation abnormalities 4 hours after endotoxin, and six of the twelve had abnormalities 5 minutes after endotoxin. With the exception of the platelet counts, the coagulation abnormality at 5 minutes and 4 hours was similar. It was characterized by a prolongation of the one-stage prothrombin time and/or partial hromboplastin time, a slight reduction in fibrinogen concentration, and a variable degree of deficiency in the activity of factors II, V, VII, VIII, IX, X, XI, and XII. This study does not define the mechanisms by which the activity of these factors are reduced; however, the several possible mechanisms are discussed. (Author)

AD-634 654 **See Field 6O**

AD-634 657 **See Field 6O**

6U. WEAPON EFFECTS

AD-634 690 **Field 6U, 6P**
CFSTI Prices: HC$1.00 MF$0.50
Human Engineering Labs., Aberdeen Proving Ground, Md.
SOME STUDIES OF TEMPORARY HEARING LOSSES RESULTING FROM REPEATED EXPOSURE TO GUNFIRE NOISE,
by David C. Hodge, and R. Bruce McCommons. Jun 66, 15p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Hearing, *Battle injuries), (*Combat noise, Hearing), (*Thresholds (Physiology), Hearing), Reliability, Deafness, Sensitivity, Pressure, Audiofrequency, Sound, Guns, Army personnel.

Studies were conducted to determine the reliability of individual and group mean temporary threshold shifts and to determine the effect on reliability of varying the number of impulses and the peak sound pressure level (SPL) of the impulses. Two different exposure conditions were used: (1) 50 impulses with a peak SPL of 155 dB, and (2) 25 impulses with a peak SPL of 158 dB. The first two studies were conducted with subjects (Ss) having 'normal' hearing. To generalize the results of the noise program to as large a proportion of the Army population as possible the third repeated noise study was conducted using subnormal-hearing Ss exposed to one of the conditions previously studied with normal-hearing Ss, i.e., 50 impulses with a peak SPL of 155 dB. The purpose of the fourth study was to determine the reliability of TTS with particular reference to frequencies of 8000 cps and above. Ss with normal hearing were exposed to the noise condition used in the second study, i.e., 25 impulses at 158 dB SPL.

7. CHEMISTRY

TID-7015 **Field 7-, 5B**
CFSTI Prices: HC$1.75 MF$1.00
Oak Ridge National Lab., Tenn.
INDEXES TO THE OAK RIDGE NATIONAL LABORATORY MASTER ANALYTICAL MANUAL (1953-1955),
by Helen P. Raaen, and Ann Klein Haas. Mar 66, 164p
Contract W-7405-eng-26

Descriptors: (*Chemical analysis, Indexes), (*Indexes, Subject indexing).

For abstract, see T 66 15.

TID-7015 (Suppl. 8) **Field 7-, 5B**
CFSTI Prices: HC$4.00 MF$1.50
Oak Ridge National Lab., Tenn.
OAK RIDGE NATIONAL LABORATORY MASTER ANALYTICAL MANUAL. SUPPLEMENT 8.
by Mar 66, 338p
Contract W-7405-eng-26

Descriptors: (*Chemical analysis, Indexes), (*Indexes, Subject indexing).

UCRL-16580 **See Field 18I**

7A. CHEMICAL ENGINEERING

AD-479 637 **Field 7A, 19A**
CFSTI Prices: HC$1.60 MF$0.50
Institute of Modern Languages, Washington, D. C.
NEW FULMINATES AND AZIDES,
by Lothar Woehler, and F. Martin. 1966, 14p
Contract DA-44-009-AMC-1563 (T)
Proj. DA-1C014501A32B-01
AERDL-T-1828-66, TT-66-61380
Uber Neue Fulminate und Azide, trans. of Chemische Berichte (West Germany) n50 p586-96 1917.

Descriptors: (*Fulminates, Synthesis (Chemistry)), (*Azides, Synthesis (Chemistry)), Silver compounds, Mercury compounds, Cadmium compounds, Thallium compounds, Copper compounds, Nickel compounds, Cobalt compounds, Zinc compounds, Manganese compounds, Iron compounds, Chromium compounds, Complex compounds, West Germany, Explosive materials.

The previously unknown simple fulminates of cadmium, thallous oxide and cuprous oxide were prepared with the aid of amalgams from silver and mercury fulminate, and were characterized. From carbonates or basic azides, it was possible to obtain with ethereal azoimide solution, in addition to the already known hydrous nickel azide, cobalt, the zinc and manganese azide; whereas ferric and chromic azide were produced as non-uniform complexes. (Author)

AD-479 639 **Field 7A, 19A**
CFSTI Prices: HC$1.60 MF$0.50
Institute of Modern Languages, Washington, D. C.
MOLECULAR WEIGHT OF FULMINIC ACID,
by Lothar Woehler. 1966, 13p
Contract DA-44-009-AMC-1563 (T)
Proj. DA-1C014501A32B-01
AERDL-T-1827-66, TT-66-61381
Die Molekulargrosse der Knallsaure, trans. of mono Chemische Berichte, Karlshure, 1905 p1351-9.

Descriptors: (*Fulminates, *Molecular weight), Explosive materials, Molecular properties, West Germany.

Identifiers: Fulminic acid.

AD-634 547 **Field 7A**
CFSTI Prices: HC$2.00 MF$0.50
Tyco Labs., Inc., Waltham, Mass.
RESEARCH STUMES ON SOLID HYDROGEN PURIFICATION MEMBRANES.
Interim technical rept. no. 1, 15 Jun 65-15 Apr 66, by M. Wright, D. Jewett, and A. C. Makrides. 15 Apr 66, 35p
Contract DA-44-009-AMC-1183 (T)

Descriptors: (*Hydrogen, Purification), (*Membranes, *Tantalum), Palladium, Metal coatings, Permeability, Thermal stability, Diffusion, Impurities, Inhibition, Solubility, Absorption (Physical), Tantalum alloys, Palladium alloys.

Identifiers: Tantalum alloy 5Pd.

The permeation rate of hydrogen through tantalum was measured over the temperature range of 400-700C and at pressures up to 160 psig. Tantalum membranes coated with a thin palladium layer, approximately 1000A thick, are stable between 400 and 525C and show rates which are limited by bulk, solid-state diffusion of hydrogen. The diffu-

sion rate through these membranes is substantially greater than that through palladium of the same thickness under the same temperature and pressure. At lower temperatures the tantalum membranes are mechanically unstable because of the lattice expansion caused by the solution of large quantities of hydrogen. At temperatures above 525C, the surface coat degrades with time. The susceptibility to poisoning of tantalum membranes coated by palladium is essentially that of pure palladium. The membranes are stable in air at room temperature and at elevated temperatures. Carbon dioxide and carbon monoxide decrease the permeation rate of hydrogen, but the effect is small and is easily reversible. Hydrogen sulfide decreases the rate of permeation substantially, and its effect is only partially erversed by replacing the gas with pure hydrogen. Preliminary measurements with Ta - 5 at % Pd membranes show that this alloy also has a substantial rate for permeation by hydrogen. (Author)

ANL-6992 **Field 7A, 9B, 18J**
CFSTI Prices: HC$3.00 MF$0.75
Argonne National Lab., Ill.
ENGINEERING DEVELOPMENT OF FLUIDBED FLUORIDE VOLATILITY PROCESSES. PART 9. COMPUTER PROGRAMS FOR ALLOY-FUEL PROCESS CALCULATIONS,
by John T. Holmes, and D. Ramaswami. Dec 65, 67p
Contract W-31-109-eng-38

Descriptors: (*Fluidized bed processes, Reactor fuels), (*Reactor fuels, Programming (Computers)).

For abstract, see T 66 15.

BNWL-213 **Field 7A, 7B, 7E**
CFSTI Prices: HC$2.00 MF$0.50
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
RESEARCH AND DEVELOPMENT ACTIVITIES, FIXATION OF RADIOACTIVE RESIDUES.
Quarterly progress rept., Oct-Dec 65,
by A. M. Platt. Feb 66, 38p
Contract AT (45-1)-1830

Descriptors: (*Radioactive waste, Processing).

For abstract, see N 20 13.

DP-1022 **Field 7A**
CFSTI Prices: HC$1.00 MF$0.50
Du Pont De Nemours (E.I.) and Co., Aiken, S. C. Savannah River Lab.
PERFORMANCE OF MIXER-SETTLERS IN THE THOREX PROCESS,
by A. A. Kishbaugh. Feb 66, 19p
Contract AT (07-2)-1

Descriptors: (*Uranium, Solvent extraction), (*Thorium, Decontamination).

Identifiers: Thorex process, Mixer-settlers.

IDO-14650 **Field 7A, 9B, 18G**
CFSTI Prices: HC$3.00 MF$0.50
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
PARTICLE GROWTH AND SIZE DISTRIBUTION IN FLUIDIZED BED PROCESSES A MATHEMATICAL MODEL WITH COMPUTER SOLUTIONS,
by Earl S. Grimmett. Apr 66, 53p
Contract AT (10-1)-205

Descriptors: (*Fluidized bed processes, Mathematical models).

For abstract, see N 20 13.

LA-3452 **Field 7A**
CFSTI Prices: HC$1.00 MF$0.50
Los Alamos Scientific Lab., Univ. of California, N. Mex.
THE DETERMINATION OF NITRIDE NITROGEN IN PLUTONIUM METAL, ALLOYS, AND COMPOUNDS,
by E. A. Hakkila, and G. R. Waterbury. 14 Jan 66, 12p
Contract W-7405-eng-36

Descriptors: (*Plutonium, Nitrogen compounds), (*Nitrides, Plutonium).

ORNL-3890 **Field 7A, 9B**
CFSTI Prices: HC$7.00 MF$1.50
Oak Ridge National Lab., Tenn.
FLOODING IN PERFORATED-PLATE PULSED EXTRACTION COLUMNS: A SURVEY OF REPORTED EXPERIMENTAL DATA AND CORRELATIONS, AND THE PRESENTATION OF NEW CORRELATIONS WITH PHYSICAL PROPERTIES, OPERATING VARIABLES, AND COLUMN GEOMETRY,
by W. S. Groenier, R. A. McAllister, and A. D. Ryon.Mar 66, 312p
Contract W-7405-eng-26

Descriptors: (*Solvent extraction, Correlation techniques), (*Chemical engineering, Statistical functions).

TID-20400 **Field 7A, 18J**
CFSTI Prices: HC$1.00 MF$0.50
Massachusetts Inst. of Tech., Cambridge. Lab. for Nuclear Science.
THE VISCOSITIES OF SOLUTIONS OF ACIDS IN TRI-N-BUTYLPHOSPHATE.
by A. S. Kertes, and P. J. Lloyd. 23 Mar 64, 7p
Contract AT (30-1)-905

Descriptors: (*Phosphates, Viscosity), (*Acids, Solvent extraction).

Identifiers: Butyl phosphates.

TID-22221 **Field 7A, 20B**
CFSTI Prices: HC$2.00 MF$0.50
Eagle-Picher Co., Miami, Okla. Research Labs.
PURIFICATION AND CRYSTALLIZATION OF AMORPHOUS BORON POWDER BY ZONE REFINING. PRE-PURIFICATION OF BORON BEFORE ZONING.
Rept. for 21 Jan-20 Jul 65,
by John R. Musgrave, Ralph J. Starks, and Harold E. Erwin. Feb 66, 48p
Contract AT (40-1)-3327

Descriptors: (*Boron, Purification), (*Crystallization, Boron).

For abstract, see N 20 12.

ANL-7077 **See Field 18J**

ANL-7083 **See Field 7B**

ANL-7152 **See Field 18D**

BMI-1765 **See Field 11F**

DP-1034 **See Field 7E**

LA-3468 **See Field 18J**

ORNL-3868 **See Field 18J**

ORNL-3918 **See Field 13I**

PB-170 735 **See Field 13B**

RL-SEP-414 **See Field 18I**

TID-22330 **See Field 18I**

Y-1531 **See Field 18G**

66-1-RE **See Field 18L**

7B. INORGANIC CHEMISTRY

AD-432 061 **Field 7B, 21I**
CFSTI Price: HC$1.60
Stauffer Chemical Co., Richmond, Calif.
HIGH ENERGY OXIDIZERS.
Annual technical summary rept., 1 Feb 63-31 Jan 64,
by K. O. Christe, and A. E. Pavlath. 31 Jan 64, 15p
Contract Nonr-4019 (00), ARPA order-399-62
Proj. NR-093-035

Descriptors: (*Oxidizers, Chemical properties), (*Fluorochlorides, Complex compounds), Synthesis (Chemistry), Chlorine compounds, Fluorides, Antimony compounds, Arsenic compounds, Boron compounds, Phosphorus compounds, Vapor pressure, Iodine compounds, Potassium compounds, Ions, Spectra (Infrared), Molecular structure, Nuclear magnetic resonance, Exchange reactions, X-ray diffraction analysis.

Identifiers: Chlorine trifluoride.

The report covers investigation on chlorinetrifluoride based complexes. The complexes were prepared in a glass vacuum line. Their composition was found to be an equimolar ratio of ClF3 and the corresponding Lewis acids. Vapor pressure measurements indicated the following order of stability of the complexes with different Lewis acids: SbF5 > AsF5 > BF3 > PF5. Conductometric measurements in ClF3 showed much higher conductivity than the components had separately. Conductometric titration in IF5 with KIF6 proved also the ionic structure. Iodinepentafluoride was also used as a solvent for freezing point depression studies and the results gave further proof for the ionic structure. Infrared studies gave definite proof for the presence of the Lewis acid in the form of anion in the complex. The exact structure of the ClF2 (+) cation could not be determined. The NMR investigations were carried out in different solvents between -80C. - +20C., but rapid fluorine exchange was observed between the complexes and the solvents which blocked the quantitative evaluation of the results. The Debye-Scherrer powder diagram of ClF2 (+)AsF6 (-) was taken and its evaluation is in progress. (Author)

AD-634 363 **Field 7B, 11I**
CFSTI Prices: HC$2.00 MF$0.50
Heidelberg Univ. (West Germany). Anorganisch-Chemisches Inst.
NITROGEN-PHOSPHOROUS POLYMERS.
Technical summary rept., Apr 63-Sep 64,
by Margot Becke-Goehring. Oct 65, 37p
Contract AF 61 (052)-682
Proj. AF-7342
Task 734201
AFML-TR-64-417

Descriptors: (*Inorganic polymers, Preparation), (*Phosphorus compounds, Polymers), (*Nitrogen compounds, Polymers), Phosphonitrile chlorides, Nitrides, Aromatic compounds, Molecular isomerism, P-heterocyclic compounds, N-heterocyclic compounds, Sulfur compounds, West Germany.

A variety of chemical systems containing phosphorus-nitrogen bonds were investigated as potential intermediates for the synthesis of polymeric materials having extreme thermal and chemical stability. These investigations include: the preparation of various phosphorus nitride salts containing phenyl groups and the reactions of these compounds with diamines in order to produce phosphorus-nitrogen polymers, the preparation of various phosphorus nitride dichlorides in order to obtain suitable starting materials for isomer preparation and the reaction of known phosphorus nitride dichlorides in such a manner as to form six- and eight-membered ring systems containing phosphorus and nitrogen as ring components which would be linked by N-S02-N bridges. (Author)

AD-634 440 **Field 7B, 21I**
CFSTI Prices: HC$3.00 MF$0.50
IIT Research Inst., Chicago, Ill. Technology Center.
RESEARCH ON CHEMISTRY OF 03F2 AND 02F2.
Annual summary rept. 1 Jan-31 Dec 1965,
by Irvine J. Solomon. 18 Mar 66, 56p IITRI-C227-14
Contract AF 49 (638)-1175
Proj. IITRI-C227
See also AD-456 915.

Descriptors: (*Oxidizers, Chemistry), (*Oxygen compounds, *Fluorides), Fluoroamines, Complex compounds, Metalorganic compounds, Boron compounds, Fluorides, Sulfur compounds, Dioxides, Spectra (Infrared), Nuclear magnetic resonance, Nitrogen compounds.

Identifiers: Aluminum methyls, Boron fluorides, Fluorimide, Nitrogen oxides, Oxygen fluorides, Sulfur dioxide.

The reactions of HNF2 with (CH3)3A1 and with B2F4 and O2F2 with SO2 and with NO2 were studied. The product of the reaction of HNF2 with (CH3)3A1 was examined by low-temperature infrared spectroscopy. The initial product is believed to be a coordination compound, HNF2.A1 (CH3)3, which decomposes at -80C and above to form (CH3)2A1NF2. In the HNF2- B2F4 system, negative deviations from ideality were observed, although a stable adduct could not be isolated. The reaction of SO2 with O2F2 produced in addition to SO2F2, interesting minor products, FSO2OF and FSO2OOF. The mechanism of the formation of these products was studied by the use of NMR analysis of the products. The reactions of SO2 with FSO2OF and FSO2OOF were studied; F2S2O5 was produced in both cases. The reactions of NO2 with O2F2 were studied. FNO3 was not formed, but only simple fluorination occurred, resulting in FNO2. The products of the reaction of O3F2 with SO2 were essentially the same as those obtained with O2F2, except that the relative quantities were different.

AD-634 641 **Field 7B**
CFSTI Prices: HC$1.00 MF$0.50
Pitman-Dunn Research Labs., Frankford Arsenal, Philadelphia, Pa.
FERROCENE CHEMISTRY OF PHOSPHORUS AND BORON,
by Gilbert P. Sollott, William R. Peterson Jr, and Jonathan L. Snead. Jun 66, 16p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Ferrocenes, Chemical reactions), (*Phosphorus compounds, Ferrocenes), (*Boron compounds, Ferrocenes), Amides, Phosphites, Catalysts, Aluminum compounds, Chlorides, Lithium compounds, Reaction kinetics, Boranes, Molecular orbitals.

A report is given on studies concerning the AlCl3-catalyzed reactions of ferrocene with phosphorus-III amides and with phosphite esters; and the boron-containing ferrocene derivatives obtained by reactions of lithioferrocene with boron trihalides.

ANL-7083 **Field 7B, 7A**
CFSTI Prices: HC$4.00 MF$0.75
Argonne National Lab., Ill.
THE SOLUBILITY OF METALS IN LIQUID ZINC,
by Irving Johnson, and Ira G. Dillon. Nov 65, 116p
Contract W-31-109-eng-38

Descriptors: (*Zinc, Solvents), (*Solvents, Zinc).
For abstract, see N 20 13.

LA-3465 **Field 7B**
CFSTI Prices: HC$1.00 MF$0.50
Los Alamos Scientific Lab., Univ. of California, N. Mex.
SEPARATION AND SPECTROPHOTOMETRIC MEASUREMENT OF LOW CONCENTRATIONS OF TANTALUM,
by G. R. Waterbury, L. E. Thorn, and R. C. Kelley.1 Feb 66, 15p
Contract W-7405-eng-36

Descriptors: (*Tantalum, Separation), (*Spectrophotometers, Tantalum).

LA-3469 **Field 7B**
CFSTI Prices: HC$1.00 MF$0.50
Los Alamos Scientific Lab., Univ. of California, N. Mex.
SPECTROPHOTOMETRIC DETERMINATION OF MICROGRAM AMOUNTS OF THORIUM IN PLUTONIUM,
by G. B. Nelson, G. R. Waterbury, and W. J. Baughman.17 Jan 66, 13p
Contract W-7405-eng-36

Descriptors: (*Plutonium, Chemical analysis), (*Thorium, Spectrophotometers).

NLCO-967 **Field 7B**
CFSTI Prices: HC$1.00 MF$0.50
National Lead Co. of Ohio, Cincinnati.
THE EFFECTS OF VARIOUS GRADES OF GRAPHITE ELECTRODES ON THE CARRIER DISTILLATION OF IMPURITIES IN U308. SUPPLEMENTAL REPORT-POCO EP-192, E P-192C, AND EP-1924 AND GENERAL GRAPHITES,
by C. E. Pepper, A. J. Pardi, and W. H. Dingeldein. Dec 65, 15p
Contract AT (31-1)-1156

Descriptors: (*Graphite, Electrodes), (*Uranium compounds, Impurities).

RFP-688 **Field 7B, 7C, 7D**
CFSTI Prices: HC$1.00 MF$0.50
Rocky Flats Div., Dow Chemical Co., Golden, Colo.
CRITICAL TEMPERATURE OF PLUTONIUM-CHLORINATED SOLVENT REACTIONS,
by S. H. Pitts Jr. 18 Feb 66, 10p
Contract AT (29-1)-1106

Descriptors: (*Plutonium, Chlorination), (*Solvent reactions, Plutonium).

AD-461 088 **See Field 10B**

AD-634 219 **See Field 7D**

AD-634 572 **See Field 20B**

AD-634 629 **See Field 19A**

BNWL-113-14 **See Field 7E**

BNWL-213 **See Field 7A**

7C. ORGANIC CHEMISTRY

AD-470 829 **Field 7C, 11I**
CFSTI Prices: HC$5.60 MF$0.50
Franklin Inst. Research Labs., Philadelphia, Pa.
A NEW TYPE OF POLYMERIZATION INVOLVING ORGANOPHOSPHORUS COMPOUNDS AS CATALYSTS.
Final rept., 1 Jun 63-27 Jan 65.
by H. Scott, T. P. Konen, and M. M. Labes. 24 Feb 65, 58p
Contract DA-18-108-AMC-169
Proj. F-B2111

Descriptors: (*Polymerization, Catalysts), (*Catalysts, Organic phosphorus compounds), (*Organic phosphorus compounds, catalysts), (*Vinly plastics, Polymerization), Imides, Acids, Chlorine compounds, Phosphates, Hydrolysis, Solvents, Nitriles, Reaction kinetics, G agents, Sensitivity.

Identifiers: Diethyl chlorophosphates, Vinyl carbazoles.

The polymerization of N-vinylcarbazole catalized by strong and weak Bronsted acids, diethylchlorophosphate and other compounds which hydrolyze to yield Bronsted acids, was studied under various reaction conditions in acetonitrile and methylene chloride as solvents. The polymerization is unaffected by oxygen and carbon dioxide. Although formulation of a rate expression remains inconclusive, it is evident that the cationic polymerization of N-vinylcarbazole has unusual features which facilitate a unique susceptibility to catalysis by low concentrations of acids, e.g. 40 parts per billion. The feasibility of selective sensitization to catalysts of interest was demonstrated. (Author)

AD-634 581 **Field 7C**
Massachusetts Inst. of Tech., Cambridge. Dept. of Chemistry.
THE PREPARATION OF DIARYLCYCLOPROPENONES BY THE REACTION OF PHENYLMERCURY WITH DIARYLACETYLENES,
by Dietmar Seyferth, and Robert Damrauer. 16 Dec 65, 3p
Grant AF-AFOSR-502-66
AFOSR-66-0982

Descriptors: (*Mercury compounds, Metalorganic compounds), (*Alkynes, Chemical reactions), (*Ketones, Synthesis (Chemistry)), Bromine compounds, Chlorine compounds, Polycyclic compounds, Hydrolysis.

Identifiers: Cyclopropenones, Phenyl (Bromo dichloromethyl) mercury, Phenyl tolycyclopropenones, Diphenyl cyclopropenones.

It was found that diarylacetylenes react with phenylmercury to give, after hydrolysis of the reaction mixture, high yields of diarylcyclopropenones. This procedure should find especially useful application in the preparation of unsymmetrical diarylcyclopropenones and of diarylcyclopropenones containing base-sensitive functional groups. Analogous reactions could not be realized with dialkylacetylenes. (Author)

AD-634 583 **Field 7C**
Notre Dame Univ., Ind. Dept. of Chemistry.
A FACILE SYNTHESIS OF BETA-ALKOXY MERCAPTANS AND BETA-THIOALKOXY MERCAPTANS,
by E. L. Eliel, T. W. Doyle, R. A. Daignault, and B. C. Newman. 14 Mar 66, 5p
Grant AF-AFOSR-772-65
AFOSR-66-0954

Descriptors: (*Thiols, Synthesis (Chemistry)), (*Organic sulfur compounds, Chemical reactions), Ethers, Aldehydes, Reduction (Chemistry), Calcium, Ammonia.

Identifiers: Thioethers.

A method is reported for the synthesis of beta-alkoxy mercaptans and beta-thioalkoxy mercaptans by the reduction of mono - and dithioketals and -acetals with calcium in liquid ammonia.

AD-634 617 **Field 7C, 11A, 6L**
CFSTI Prices: HC$1.00 MF$0.50
Walter Reed Army Medical Center, Washington, D. C. Army Medical Biomechanical Research Lab.
SYNTHESIS AND DEGRADATION OF POLY ALKYL ALPHA CYANOACRYLATES,
by Fred Leonard, Ramchandra K. Kulkarni, George Brandes, and Joshua Nelson. Jun 66, 15p

Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N.

Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Adhesives, Acrylic resins), (*Acrylic resins, Chemical reactions), Degradation, Polymerization, Physical properties, Nitriles, Polymers, In vitro analysis, In vivo analysis, Polymerization, Reaction kinetics, Tissues (Biology).

Identifiers: Poly cyanoacrylates, Tissue adhesives.

The capability of rapidly polymerizing monomeric alpha cyanoacrylates to adhere firmly to moist surfaces has evoked considerable medical interest in their potentialities as hemostatic agents and tissue adhesives for closure of wounds in place of, or as adjuncts to, the conventional surgical sutures. A report is given on the synthesis of the homologous series of alkyl-alpha-cyanoacrylates, their physical properties with respect to purity and also the kinetics of in vitro degradation of poly-alkyl-alpha-cyanoacrylates in the presence of water, both in the heterogeneous and homogeneous phases. Other important findings on the mode of polymerization are given and comparison of in vitro with the in vivo degradation results are made. (Author)

AD-634 735 **Field 7C**
CFSTI Prices: HC$2.00 MF$0.50
Research Triangle Inst., Durham, N. C. Natural Products Lab.
THE PREPARATION OF SMALL RING COMPOUNDS CONTAINING SILICON. PART I. VINYL-HYDROGEN LIGAND EXCHANGE ON SILICON. PART II. THE PREPARATION AND ISOMERIZATION OF MONOCYCLIC SILYLHYDRAZINES. PART III. ON THE ATTEMPTED SYNTHESIS OF THE 1,2-DISILACYCLOBUTANE RING SYSTEM.
Technical rept. no. 1, Jun 65-Jun 66,
by Colin G. Pitt, Kenneth R. Skillern, and Glenn L. Roof. Jun 66, 29p
Contract Nonr-4860 (00)
Proj. NR-052-476

Descriptors: (*Silicon compounds, Synthesis (Chemistry)), (*Silanes, *Heterocyclic compounds), Exchange reactions, Catalysis, Disproportionation, Decomposition, Molecular isomerism, Cyclohexanes, Cyclopentanes, Chemical equilibrium, Hydrazine derivatives, Cyclobutanes, Ethanes, Oxidation.

Identifiers: Disila cyclohexanes, Disila cyclopentanes, Si-heterocyclic compounds, Silyl ethanes, Silyl hydrazines, Tolyl silanes.

The first example of vinyl-hydrogen ligand exchange at silicon, catalyzed by chloroplatinic acid, is described. The disproportionation of tri-p-tolylsilane to di-p-tolylsilane and tetra-p-tolylsilane is shown to occur without isomerization to ortho, meta or benzyl isomers. The aluminum chloride catalyzed fragmentation of bis-1,2- (dimethylchlorosilyl) ethane and 1-triethylsilyl-2-dimethylchlorosilylethane is reported. (u) The preparation of 3,3,6,6 - tetramethyl - 1,2 - diaza - 3,6 - disilacyclohexane and 1-amino-2,2,5,5-tetramethyl-1-aza-2,5-disilacyclopentane is described. The two compounds are shown to be in equilibrium at room temperature even in the absence of catalysts. 1,2-bis(trimethylsilyl)hydrazine is shown to be in equilibrium with 1,1-bis(trimethylsilyl)hydrazine, although thermal equilibration is relatively slow. The preparation of the 1,2-disilacyclobutane ring system was attempted by (1)ring closure of bis-1,2-(chlorosilyl)ethanes with various metals and (2)oxidation of 3,3,6,6-tetramethyl-1,2-diaza-3,6-disilacyclohexane and 1-amino-2,2,5,5-tetramethyl-1-aza-2,5-disilacyclopentane with mercuric oxide and ethyl azodicarboxylate. The products obtained from these oxidations were characterized and their formation discussed. (Author)

COO-314-11 **Field 7C**
CFSTI Prices: HC$1.00 MF$0.50
Noyes Chemical Lab., Univ. of Illinois, Urbana.
AROMATIC BORONIC ACIDS. SYNTHESIS OF OMICRON-BORONOPHENYLALANINE,
by J. R. Kuszewski, W. J. Lennarz, and H. R. Snyder. 1961, 19p
Contract AT (11-1)-314

Descriptors: (*Phenylalanine, Boric acids), (*Boric acids, Synthesis (Chemistry)).

For abstract, see T 66 15.

PB-169 896 **Field 7C, 11I**
CFSTI Prices: HC$2.60 MF$0.50
English Electric Co., Ltd., Luton.
PHOSPHIMIDAZOLENE POLYMERS,
by R. Twaits. Oct 65, 24p Rept. no. 133

Descriptors: (*P-heterocyclic compounds, Polymers), (*N-heterocyclic compounds, Polymers), (*Polymers, P-heterocyclic compounds), Amines, Phosphorus compounds, Chlorides, Polymerization, Crosslinking (Chemistry), Organic phosphorus compounds, Synthesis (Chemistry), Great Britain.

Identifiers: Phosimidazolenes.

Simple low molecular weight model compounds containing the phosphimidazolene ring were prepared from o-diamines and phosphorus dichlorides or diamides. Attempts to prepare polymers containing this ring structure, either by linking together preformed rings or by a simultaneous ring closure polymerisation reaction between an aromatic tetra-amine and bis (phosphonic dichloride), or a bis (phosphonic diamide), gave incomplete reactions and cross-linking. The polymers obtained were in general brittle infusible solids and hydrolytically unstable. The preparation of some new diphosphorus compounds is described. (Author)

AD-447 561 **See Field 7D**

AD-470 146 **See Field 11C**

AD-479 670 **See Field 7D**

AD-634 234 **See Field 11I**

AD-634 619 **See Field 11K**

BNWL-113-14 **See Field 7E**

RFP-688 **See Field 7B**

UCRL-16492 **See Field 6A**

7D. PHYSICAL CHEMISTRY

AD-447 561 **Field 7D, 7C**
CFSTI Price: HC$3.60
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
THERMAL DEGRADATION OF AN AROMATIC POLYPYROMELLITIMIDE IN AIR AND VACUUM: I. RATES AND ACTIVATION ENERGIES,
by S. D. Bruck. Oct 63, 35p TG-529

Descriptors: (*Polymers, Degradation), (*Aromatic compounds, Polymers), Pyrolysis, Stability, Vacuum, Heat of activation, Instrumentation, O-heterocyclic compounds, Evaporation, Spectra (Infrared).

The thermal degradation of a polypyromellitimide (condensation product of pyromellitic anhydride and an aromatic diamine) was studied in air and vacuum in the range 400 to 700 C by thermogravimetry using a recording electrobalance. Although this organic polymer is remarkably stable in air up to approximately 420 C, at temperatures in excess of this it begins to volatilize. At 485 C practically total volatilization takes place within approximately 5 hr. In vacuum, the polymer shows greater heat stability, with no appreciable weight loss even after prolonged exposure to temperatures up to approximately 500 C. Above this temperature it begins to volatilize, leaving a brittle, carbonized residue which appears to reach a limiting weight corresponding to approximately 45% of the original sample, and showing no infrared absorption bands. The rates of volatilization were calculated from the thermal degradation profiles. The Arrhenius relationship gave an activation energy of 32 kcal/mole and 74 kcal/mole for degradation in air and vacuum, respectively. (Author)

AD-449 831 **Field 7D**
CFSTI Price: HC$2.60
Little (Arthur D.), Inc., Cambridge, Mass.
STRUCTURE MAKERS AND BREAKERS IN WATER: PRESSURE-INDUCED CHANGES IN THE HYDRATION ATMOSPHERES OF IONS IN SOLUTION,
by R. A. Horne. 30 Sep 64, 28p Technical rept. TR-3
Contract Nonr-4424 (00)
Task NRO-51-460

Descriptors: (*Ions, Alkali metals), (*Alkali metals, Solutions), (*Solutions, Ions), Halides, Alkali metal compounds, Pressure, Temperature, Viscosity, Data, Hydrostatic pressure, Electrical conductance, Water, Tables.

The alkali metal cations may be divided into two classes. Class I consisting of Li (+) and Na (+) have four waters symmetrically arranged in their innermost solvation sheath. The application of hydrostatic pressure reduces this number to 1. Members of this class are structure makers and have positive viscosity B-coefficients. Class II consists of K (+), Rb (+), and Cs (+), which have one water in their innermost solvation sheath, which are completely dehydrated by the application of pressure, and which, due to their assymetry, are structure breakers with negative B-coefficients. Br (-) and Cl (-) tend to resemble Class II but F (-) and I (-) are exceptional in certain respects. I (-) appears to be unhydrated even at one atmosphere. (Author)

AD-479 670 **Field 7D, 7C, 19A**
CFSTI Prices: HC$1.60 MF$0.50
Institute of Modern Languages, Inc., Washington, D. C.
KINETICS AND MECHANISM OF THERMAL DISINTEGRATION OF LOW-MOLECULAR ALKYL AZIDES,
by G. Geiseler, and W. Koenig. 1965, 15p
Contract DA-44-009-AMC-1563 (T)
Proj. DA-1C014501A32B-01
AERDL-T-1825-66, TT-66-61382
Trans. of mono. Kinetik und Mechanismus des Thermischen Zerfalls der Niedermolekularen Alkylazide, Leipzig 1963, p81-92.

Descriptors: (*Azides, Pyrolysis), Reaction kinetics, Decomposition, Pressure, Temperature, Chemical analysis, Spectra (Infrared), Imines, Polymerization, Elimination reactions, Explosive materials, East Germany.

Identifiers: Ethyl azides, Propyl azides.

The thermal disintegration of ethyl-, n-propyl- and i-propyl azides in the gas phase was kinetically analysed by means of a static and dynamic measuring arrangement. In case of all azides above 25 torr, it does not depend upon pressure, occurs almost homogeneously and follows the first order law. Qualitative and half quantitative IR spectral analyses helped to make conclusions about the separate partial steps of the disintegration. Most probably the process of disintegration starts with the elimination of nitrogen and the formation of a corresponding imine which stabilizes, dimerizes and respectively polymerizes, either on account of intramolecular shift of hydrides, or absorption of hydrogen out of adjacent homogeneous molecules. A radical chain mechanism must be excluded.

However, a noticeable reaction of elimination takes place. (Author)

AD-634 135 **Field 7D, 20M, 11B**
CFSTI Prices: HC$3.00 MF$0.50
Naval Radiological Defense Lab., San Francisco, Calif.
ON THE FEASIBILITY OF ANALYZING ABLATOR BLOW-OFF GASES WITH A TIME-OF-FLIGHT MASS SPECTROMETER,
by Kenneth A. Lincoln. 4 Apr 66, 53p
USNRDL-TR-1014
Proj. DASA-NWER-A-8

Descriptors: (*Ablation, Combustion gases), (*Combustion gases, Gas analysis), (*Gas analysis, Mass spectroscopy), Spectrum analyzers, Pyrolysis, Heat-resistant materials, Feasibility studies, Heat shields.

Identifiers: Ablative materials, Time-of-flight mass spectrometers.

The subject of determining the composition of blow-off gases from rapidly heated ablators is treated entirely from the experimental point of view. The various equipment requirements are briefly described including the thermal sources for heating materials as well as the vacuum systems needed to sample the gases directly from the pyrolysis zone into the inlet of the spectrometer. Particular attention is given to the state of the art of time-of-flight (TOF) mass spectrometry. The unique abilities of the instrument as well as its limitations are assessed, and the instrumental factors which influence mass spectral patterns are carefully delineated. The equipment presently available for recording output spectra is appraised and the corresponding limitations are outlined. In addition, the subject of quantitative analysis of gaseous mixtures by mass spectrometry is reviewed with particular reference to the TOF instrument and its application to ablation-product analysis. This is extended to include an exploration into the possibilities of utilizing electronic data-computing machines to resolve complex mixture mass spectra into meaningful chemical analysis. (Author)

AD-634 145 **Field 7D**
CFSTI Price: MF$1.00
National Bureau of Standards, Washington, D. C. Inst. for Basic Standards.
ATOMIC TRANSITION PROBABILITIES. VOLUME I. HYDROGEN THROUGH NEON,
by W. L. Wiese, M. W. Smith, and B. M. Glennon. 20 May 66, 170p
NSRDS-NBS-4-Vol-1

Descriptors: (*Electron transition, Probability), (*Line spectrum, Electron transitions), (*Atomic spectroscopy, Electron transitions), Hydrogen, Helium, Lithium, Beryllium, Boron, Carbon, Nitrogen, Oxygen, Fluorine, Neon, Selection rules, Emissivity, Atomic energy levels, Tables.

Identifiers: Defender project.

Atomic transition probabilities for about 4,000 spectral lines of the first ten elements, based on all available literature sources, are critically compiled. The data are presented in separate tables for each element and stage of ionization. For each ion the transitions are arranged according to multiplets, supermultiplets, transition arrays, and increasing quantum numbers. Allowed and forbidden transitions are listed separately. For each line the transition probability for spontaneous emission, the absorption oscillator strength, and the line strength are given along with the spectroscopic designation, the wavelength, the statistical weights, and the energy levels of the upper and lower states. In addition, the estimated accuracy and the source are indicated. In short introductions, which precede the tables for each ion, the main justifications for the choice of the adopted data and for the accuracy rating are discussed. A general introduction contains a critical review of the major data sources. Author)

AD-634 219 **Field 7D, 7B, 21I**
CFSTI Prices: HC$1.00 MF$0.50
Rocket Propulsion Establishment, Westcott (England).
THE DISSOCIATION ENERGY OF THE N-H BOND IN HYDRAZINE AND RELATED COMPOUNDS.
Technical rept.,
by I. P. Fisher. Dec 65, 22p RPE-TR-65/11

Descriptors: (*Hydrazine, Dissociation), (*Heat of solution, Hydrazine), Chemical bonds, Thermochemistry, Heat of formation, Ionization potentials, Electron bombardment, Enthalpy, Hydrazine derivatives, Great Britain.

There are, currently, two values proposed for the N-H bond dissociation energy in hydrazine. Arguments are presented in favour of the lower value. Bond strengths, heats of formation and ionization potentials of radicals related to the hydrazyl radical are derived. (Author)

AD-634 228 **Field 7D, 4A, 19D, 20D K**
CFSTI Prices: HC$1.00 MF$0.50
Department of the Navy, Washington, D. C.
THE STRUCTURE OF SHOCK WAVES IN AIR WITH ACCOUNT BEING TAKEN OF THE KINETICS OF CHEMICAL REACTIONS AND THE EXCITATION OF MOLECULAR VIBRATIONS OF NITROGEN,
by S. N. Anisimov, N. M. Kuznetsov, and E. F. Nogotov. 1966, 15p Translation-2142
TT-66-61471
Struktura Udarnykh Voln v Vozdukhe s Uchetom Kinetiki Khimicheskikh Reaktsii i Vozbuzhdeniya Molekulyarnykh Kolebanii Azota, trans. of Termofizika Vysokikh Temperatur (USSR) v2 n3 p337-43 1964.

Descriptors: (*Air, Shock waves), (*Shock waves, Reaction kinetics), (*Nitrogen, Excitation), Chemical bonds, Fluorescence, Relaxation time, Equations, Integration, Concentration (Chemistry), Density, Temperature, Pressure, USSR.

Identifiers: Nitrogen oxides.

By numerical integration of the kinetic equations for the chemical reactions and the relaxation equation for the excitation of molecular vibrations of nitrogen, the concentrations of the components, density, and temperature of the air behind the shock wave front were calculated. The calculations were carried out over a wide range of air densities and shock wave velocities. The question of extrema of pressure and density in the structure of the wave was considered. (Author)

AD-634 298 **Field 7D, 10C**
CFSTI Prices: HC$1.10 MF$0.50
Department of the Navy, Washington, D. C.
KINETICS OF IONIZATION OF OXYGEN,
by A. I. Krasilshchikov, and V. A. Andreeva. 1966, 9p Translation-2150
TT-66-61502
Kinetika Ionizatsii Kisloroda, trans. of Zhurnal Fizicheskoi Khimii (USSR) v27 n3 p389-93 1953.

Descriptors: (*Oxygen, Ionization), (*Gas ionization, Reaction kinetics), (*Electrolysis, Oxygen), Electrolytic cells, Electrodes, Nickel, Platinum, Silver, Electrolytes, Reduction (Chemistry), Reaction kinetics, USSR.

Ionization of oxygen on a nickel electrode in alkali was investigated under pressure. The phenomenon of 'cathode passivity' of nickel relative to the process of reduction of oxygen is described. Ionization of oxygen on smooth platinum in acid and alkaline solutions was investigated. The high sensitivity of the process to various types of poisoning is shown. A kinetic scheme for the reduction of oxygen on an activated smooth platinum electrode is proposed. Kinetic schemes for the reduction of oxygen on platinum and silver are compared. The effect of the forming radicals on the process of cathode reduction of oxygen is discussed. (Author)

AD-634 312 **Field 7D, 4A**
CFSTI Prices: HC$3.00 MF$0.75
Mithras, Inc., Cambridge, Mass.
A WIND TUNNEL INVESTIGATION OF THE NITRIC OXIDE-OXYGEN ATOM REACTION.
Final rept., 1 Jan-30 Nov 65,
by R. Earl Good, and Jacques A. F. Hill. Mar 66, 72p MC-64-116-R1
Contract AF 19 (628)-4959
Proj. AF-7635
Task 763501
AFCRL-66-284

Descriptors: (*Nitrogen compounds, Chemical reactions), (*Oxygen, Chemical reactions), (*Upper atmosphere, Chemical reactions), Wind tunnels, Chemiluminescence, Oxides, Dissociation, Shock waves, Reaction kinetics, Sounding rockets, Scale.

Identifiers: Nitrogen oxides.

The technique of upper atmosphere measurements by analyzing the chemiluminescence of nitric oxide trails deposited by rockets was investigated using wind tunnel simulation. The nitric oxide was released from a model into the low density tunnel flow which had been partially dissociated upstream of the plenum chamber by microwave discharge. The radiant power produced was measured separately by photographic and photoelectric techniques under controlled nitric oxide and atomic oxygen concentration flow rates. The tests were conducted at Mach number 3.4 and at freestream pressures between 1 and 10 microns Hg. The geometric shape of the radiating mixing layer contained between two shockwaves was observed and described in terms of the flow rates. The chemiluminescent NO + O to NO2 + photon reaction rate measured by two independent techniques was found to be k = 3 (plus or minus 2) x 10 to the -12th power cu cm/molecules/seconds. Scaling laws were developed to relate the radiant power to the concentration flow rates. These scaling laws were then used to determine the absolute oxygen concentrations in the upper atmosphere from previously conducted flight experiments. Excellent agreement was obtained between the densities obtained by the nitric oxide release technique and mass spectrometer measurements. (Author)

AD-634 399 **Field 7D**
CFSTI Prices: HC$3.00 MF$0.75
Noyes Chemical Lab., Univ. of Illinois, Urbana.
HIGH TEMPERATURE GAS KINETIC STUDY OF NITROUS OXIDE DECOMPOSITION PERFORMED WITH A SHOCK TUBE AND QUADRUPOLE MASS-FILTER.
Research rept.,
by David Gutman. May 65, 91p RR-2
Grants AF-AFOSR-62-245, AF-AFOSR-588-64
AFOSR-66-0952

Descriptors: (*Nitrogen compounds, Decomposition), (*Shock waves, *Reaction kinetics), Shock tubes, Mass spectroscopy, Oxides, Chemical reactions, Ion sources, Pyrolysis, Ionic current, Oxygen.

Identifiers: Nitrogen oxides.

A quadrupole mass-filter was built and coupled to a shock tube in order to study high temperature gas kinetics. The chemical kinetics of the decomposition of nitrous oxide was studied with this apparatus in order to establish the mechanism of the reaction at temperatures above 1000K. Several instrumentation problems unique to shock tube mass-spectrometry were solved. The most serious problem, that of a rapid-pumping ion source, was overcome by the design and construction of an unusually thin ion source. The thermal decomposition of nitrous oxide was studied by shock-heating a mixture of 4% N2O in argon and monitoring the

ion currents corresponding to all of the principal species involved in the reaction: N2O, N2, O2, NO, and O. In each run with the shock tube, the mass-filter was tuned to follow the concentration of a single species. Because enough runs were made with all of the species, a run for each species at the same temperature was made for several temperatures. (Author)

AD-634 423 **Field 7D**
CFSTI Prices: HC$4.00 MF$0.75
Noyes Chemical Lab., Univ. of Illinois, Urbana.
HIGH TEMPERATURE GAS KINETIC STUDY OF CARBONYL SULFIDE DECOMPOSITION PERFORMED WITH A SHOCK TUBE AND QUADRUPOLE MASS-FILTER.
Research rept.,
by Arthur James Hay. Feb 66, 112p RR-3
Grants AF-AFOSR-62-142, AF-AFOSR-588-64
AFOSR-66-0958

Descriptors: (*Carson compounds, Decomposition), (*Sulfides, Decomposition), (*Shock waves, *Reaction kinetics), Shock tubes, Mass spectroscopy, Pyrolysis, Thermochemistry, Photochemistry.

Identifiers: Carbon oxysulfide.

A quadrupole mass-filter coupled to a shock-tube was used to study high temperature gas kinetics. The chemical kinetics of the thermal decomposition of carbonyl sulfide was studied with this apparatus in order to establish the mechanism of the reaction in the temperature range 2000 to 3200K. (Author)

AD-634 428 **Field 7D**
CFSTI Prices: HC$1.00 MF$0.50
Noyes Chemical Lab., Univ. of Illinois, Urbana.
MATRIX ISOLATION AND MASS-SPECTROMETRIC STUDIES OF SPECIES PRODUCED IN A SHOCK TUBE.
Final technical rept.,
by R. Linn Belford. May 66, 5p
Grants AF-AFOSR-62-245, AF-AFOSR-588-64
AFOSR-66-0957

Descriptors: (*Shock waves, *Reaction kinetics), Mass spectroscopy, Shock tubes, Nitrogen compounds, Oxides, Carbon compounds, Sulfides.

Identifiers: Carbon oxysulfide, Nitrogen oxides.

A brief summary is given of studies concerning the mass detection of chemical species produced in a shock tube. A list of the reports and publications generated under the contract is included.

AD-634 437 **Field 7D, 20J**
CFSTI Prices: HC$2.00 MF$0.50
Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
POPULATION DISTRIBUTIONS DURING VIBRATIONAL RELAXATION OF DIATOMIC GASES,
by J. W. Rich, and R. G. Rehm. Apr 66, 32p
CAL-AF-2022-A-1
Contract AF 49 (638)-1488
AFOSR-66-0720

Descriptors: (*Diatomic molecules, Relaxation time), (*Molecular energy levels, Statistical distribution), Vibration, Excitation, Equations, Perturbation theory.

A master equation analysis for the vibrational relaxation of a diatomic gas is presented, including the effects of near-resonance exchange of vibrational energy between colliding oscillators. It is found that the mechanism of rapid near-resonance exchange of vibrational energy among the diatomic species tends to maintain a quasi-steady state vibrational population distribution during the relaxation of a pure gas. The specific functional form of this quasi-steady state distribution is determined from a perturbation analysis of the master equation. Detailed analyses are also given of the relaxation equations for the case of equi-distant vibrational energy level spacing. It is found that when the diatomic gas is diluted by an inert to the extent that oscillator-oscillator exchange collisions no longer influence relaxation, the vibrational population distribution can depart markedly from the Boltzmann form. Whenever exchange collisions predominate, however, it is found that a near-Boltzmann distribution is preserved, regardless of the form of the vibration-translation transition probabilities, and the energy relaxation equation does not differ greatly from the Landau-Teller result. (Author)

AD-634 573 **Field 7D**
North Carolina Univ., Chapel Hill. Dept. of Chemistry.
DELAYED IONIZATION OF EXCITED PHENANTHRENE AND ANTHRACENE IN SOLUTION,
by Allan Kawada, and R. C. Jarnagin. 25 Aug 65, 10p
Grant DA-ARO (D)-31-124-G579
AROD-4885:1

Descriptors: (*Phenanthrenes, Ionization), (*Anthracenes, Ionization), (*Photoelectric effect, Polycyclic compounds), Molecular energy levels, Excitation, Organic solvents, Quenching (Inhibition), Carriers (Semiconductors), Solutions.

Identifiers: Organic semiconductors.

The delayed ionization of excited states of phenanthrene and anthracene was observed in tetrahydrofuran solution. The measured photocurrent rose, attained a maximum, and decayed in time very long compared to flash duration. No currents were observable in hexane solution and current response was quenched on admission of O2 to the tetrahydrofuran solutions. The observed time dependence, dependence on flash intensity, and wavelength dependence are consistent with an interpretation based on triplet B1 excitation via intersystem conversion from excited singlet A1 and the subsequent interaction of two triplet B1 molecules to yield current carriers. (Author)

AD-634 576 **Field 7D**
CFSTI Prices: HC$3.00 MF$0.50
Western Reserve Univ., Cleveland, Ohio. Ultrasonics Research Lab.
ULTRASONIC VIBRATION POTENTIALS AND THEIR USE IN THE DETERMINATION OF IONIC PARTIAL MOLAL VOLUMES.
Technical rept.,
by Raoul Zana, and Ernest Yeager. 6 Jun 66, 54p
TR-29
Contract Nonr-1439 (04)
Proj. NR-384-305

Descriptors: (*Electrolytes, *Ultrasonic radiation), (*Ions, Volume), Vibration, Viscosity, Electrical double layer.

Identifiers: Sonochemistry.

The propagation of ultrasonic waves through an ionic solution gives rise to alternating potential differences (ionic vibration potentials) within the solution as a result of differences in the dynamic reactions of the cations and anions to the acoustical waves. The amplitude of the effect is a function of the masses of the solvated ions minus the mass of the free solvent displaced by each ion. Experimental studies were carried out with many electrolytes with particular attention to the elimination of possible false effects. The observed dependence of the ionic vibration potentials on various parameters is in good agreement with theory. From ionic vibration potentials and density data, the absolute values for the ionic partial molal volumes were determined for a number of simple monovalent ions without any assumption as to the value for a given ion or the ratio of values for any pair of ions. (Author)

AD-634 578 **Field 7D, 20A**
California Inst. of Tech., Pasadena. Div. of Chemistry and Chemical Engineering.
ABSORPTION OF SOUND NEAR THE CRITICAL POINT OF THE NITROBENZENE-ISO-OCTANE SYSTEM,
by A. V. Anantaraman, A. B. Walters, P. D. Edmonds, and C. J. Pings. 12 Nov 65, 10p
Contracts AF 49 (638)-1273, Nonr-220 (40)
AFOSR-66-0983

Descriptors: (*Ultrasonic radiation, Absorption), (*Sound, Absorption), (*Nitrobenzenes, Acoustic properties), (*Alkanes, Acoustic properties), Phase studies, Transition temperature, Frequency, Theory.

Identifiers: Octanes, Sonochemistry.

Measurements by the pulse technique were made of the absorption of sound in the nitrobenzene-iso-octane system (Tc =30.2C) over the full composition range, at temperatures of 30.5C, 34.8Cand 44.8C for five frequencies between 4.5 and 16.5 Mc/sec. At the lowest frequency and at 0.3C above the critical temperature, the absorption is anomalously large by a factor of 47; 14.6C above Tc, the absorption is still in excess of classical predictions by a factor of 11. The data cannot be represented by a model involving only a single relaxation frequency. The Fixman theory is in reasonable, but not exact, agreement with the data with regard to functional conformity in temperature and frequency; in particular, the predicted frequency dependence at the critical state is verified within experimental error. The Fixman theory and the data preclude anything but a simple pole at the critical temperature for the reciprocal square of kappa, the exponential decay constant in the long-range correlation function. However, if it is assumed that kappa sq. = 6l to the -2 power (T/Tc-1) (1 + al (T/Tc-1)), the theory and experiment are in agreement over the full range of temperature and frequency, with a value of a1=0.0296. (Author)

AD-634 598 **Field 7D**
CFSTI Prices: HC$1.10 MF$0.50
Department of the Navy, Washington, D. C.
KINETICS OF THE ELECTROCHEMICAL REDUCTION OF OXYGEN,
by T. N. Belina, and A. I. Krasilshchikov. 1966, 10p Translation-2149
TT-66-61573
Kinetika Elektrochimicheskovo Bosstanovleniya Kisloroda, trans. of Zhurnal Fizicheskoi Khimii (USSR) v28 n7 p1286-91 1954.

Descriptors: (*Oxygen, Reduction (Chemistry)), (*Electrochemistry, Oxygen), Reaction kinetics, Cathodes (Electrolytic cell), Silver, Platinum, Palladium, Pressure, Polarization, Electrolytes, USSR.

It was confirmed that cathode reduction of oxygen in alkaline solutions on silver, unlike mercury, is connected with electrochemical polarization. The cathode reduction of oxygen was investigated at different pressures in acid and alkaline solutions on smooth and platinized platinum and palladium. The reduction of oxygen on platinum is limited by the purely chemical stage of the process. (Author)

AD-634 625 **Field 7D**
CFSTI Prices: HC$1.00 MF$0.50
Coating and Chemical Lab., Aberdeen Proving Ground, Md.
COHESIVE ENERGIES IN ORGANIC LIQUIDS,
by Edwin F. Meyer, Robert E. Wagner, and Myer Rosenfeld. Jun 66, 14p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Liquids, *Molecular association), (*Ketones, Molecular association), Organic compounds, Acetones, Pentanones, Energy, Numerical analysis, Solubility, Theory.

Identifiers: Cohesion.

A method for quantitative estimation of the contributions of dispersion, induction, and orientation energies to cohesion in polar organic liquids is proposed and illustrated with the methyl n-alkyl ketones. Dispersion always predominates, with induction in a minor, but constant role. Orientation rapidly loses significance as the hydrocarbon side chain is increased. Induction energy is more important than is generally appreciated, contributing 5-10% to the total cohesion of the higher, 'mostly non-polar' 2 ketones. (Author)

AD-634 708 **Field 7D**
Aerospace Research Labs., Office of Aerospace Research, Wright-Patterson AFB, Ohio.
EFFECT OF TRANSLATIONAL ENERGY ON ION-MOLECULE REACTION RATES. II,
by Keith R. Ryan, and Jean H. Futrell. 12 May 65, 10p ARL-66-0048
See also AD-618 179.

Descriptors: (*Ions, Reaction kinetics), (*Molecules, Reaction kinetics), (*Reaction kinetics, Energy), Protons, Hydrogen, Chemical reactions, Condensation reactions, Ammonia, Water, Hydrochloric acid, Probability, Transport properties.

Identifiers: Translational energy.

A number of ion-molecule reactions were studied by a method which allows considerable ion energy resolution in the region below 1 eV. The experiments show clearly that both the proton or hydrogen-atom transfer reactions as well as the condensation reactions studied can readily be explained in terms of the slow-ion theory of Gioumousis and Stevenson. Results for the three permanent dipole molecules studied. NH3, H2O, and HCl, indicate that the protonated molecular-ion formation can be explained using the energy-dependent cross section developed by Moran and Hamill. The application of this collision cross section expression leads to the conclusion that one collision in three produces the protonated parent for both NH3 and H2O and one collision in five for HCl. (Author)

AD-634 715 **Field 7D**
CFSTI Prices: HC$1.10 MF$0.50
Naval Research Lab., Washington, D. C.
OPTICAL INVESTIGATION OF ADSORPTION AND SURFACE CONDENSATION OF VAPORS NEAR SATURATION,
by B. V. Deryagin, and Z. M. Zorin. 1956, 10p NRL-Trans-569
TT-66-61575
Opticheskoe Issledovanie Adsorptisii i Poverkhnostnoi Kondensatsii Parov Vblizi Nasyscheniya, trans. of Akademiya Nauk SSSR. Doklady, v98 n1 p93-6 1954. See also TT 61-12997.

Descriptors: (*Vapors, Optical properties), (*Adsorption, Vapors), (*Condensation, Vapors), (*Surface properties, Vapors), Viscosity, Vapor pressure, Dew, Drops, Water, Alcohols, Benzene, Carbon tetrachloride, Glass, USSR.

The thickness of an adsorbed layer of liquid was measured by elliptical polarization of light reflected under an oblique angle and was analyzed with the aid of a polarization microscope. The adsorption of alcohols, water, carbon tetrachloride, and benzene was shown on graphs plotting thickness versus the ratio of the relative pressures. For polar substances, the graph for isotherm adsorption on glass intersects the saturation ordinate. For nonpolar substances the isotherm asymptotically tends toward the ordinate. The existence of a break in the continuity of vapor condensation of polar liquids is explained by the structural characteristics of the boundary phase.

AD-634 724 **Field 7D**
CFSTI Prices: HC$2.00 MF$0.50
Uppsala Univ. (Sweden). Quantum Chemistry Group.
DIFFERENT ORBITALS FOR DIFFERENT SPINS. SOME RESULTS FOR THE LiH MOLECULE,
by Peter Lindner. 15 Jan 66, 37p Scientific-6
Contract AF 61 (052)-874
ARL-66-0119

Descriptors: (*Lithium compounds, Hydrides), (*Molecular orbitals, Lithium compounds), (*Nuclear spins, Molecular orbitals), Wave functions, Electrons, Polarization, Molecular energy levels, Dipole moments, Valence, Sweden.

Identifiers: Lithium hydride.

A trial was made to split the molecular orbital for the valence electrons in the LiH molecule. A comparison of the results obtained by use of a wavefunction that is not a pure spin state function and one which is a pure singlet is made. Some comments on the different spinfunctions are made. The effect of different polarization of the outer Li-electron is discussed. Total energies and dipole moments are computed. Finally some remarks on the use of the virial theorem are made. (Author)

ANL-7113 **Field 7D, 9B, 18D**
CFSTI Prices: HC$1.00 MF$0.50
Argonne National Lab., Ill.
A METHOD FOR AUTOMATIC ANALYSIS OF DATA ON THE KINETICS OF FAST CHEMICAL REACTIONS IN THE FORM OF PICTURES OF OSCILLOSCOPE TRACES,
by Myran C. Sauer Jr. Oct 65, 15p
Contract W-31-109-eng-38

Descriptors: (*Chemical reactions, Oscilloscopes), (*Photographic analysis, Programming (Computers)).

For abstract, see T 66 15.

FSU-2690-18 **Field 7D**
CFSTI Prices: HC$3.00 MF$0.75
Florida State Univ., Tallahassee. Dept. of Chemistry.
DELOCALIZED EXCITATION AND EXCITATION TRANSFER.
Bulletin no. 18,
by T. Foerster. 1964, 68p
Contract AT (40-1)-2690

Descriptors: (*Molecules, Excitation), (*Ground State, Molecules).

IS-1344 **Field 7D**
CFSTI Prices: HC$5.00 MF$1.00
Ames Lab., Iowa State Univ. of Science and Tech.
APPARENT MOLAL VOLUMES AND VISCOSITIES OF SOME AQUEOUS RARE-EARTH CHLORIDE SOLUTIONS AT 25 DEG C,
by Michael Jon Pikal, and F. H. Spedding. Feb 66, 173p
Contract W-7405-eng-82

Descriptors: (*Rare earth compounds, Electrolytes), (*Electrolytes, Rare earth compounds).

For abstract, see N 20 13.

K-1638 **Field 7D**
CFSTI Prices: HC$2.00 MF$0.50
Oak Ridge Gaseous Diffusion Plant, Tenn.
DETERMINATION OF METALLIC IMPURITIES IN ALUMINUM BY X-RAY FLUORESCENCE,
by C. A. Kienberger, and A. R. Flynn. 14 Jan 66, 19p K-1638
Contract W-7405-eng-26

Descriptors: (*X rays, Fluoreacence), (*Aluminum, Impurities).

LA-3391 **Field 7D**
CFSTI Prices: HC$2.00 MF$0.50
Los Alamos Scientific Lab., Univ. of California, N. Mex.
MOLECULAR AND PRINCIPAL SERIES ABSORPTION IN CESIUM-ARGON MIXTURES,
by J. E. Sollid. 17 Sep 65, 24p
Contract W-7405-ENG-36

Descriptors: (*Cesium compounds, Argon), (*Absorption, Mixtures).

LA-3423 **Field 7D, 18D**
CFSTI Prices: HC$1.00 MF$0.50
Los Alamos Scientific Lab., Univ. of California, N. Mex.
AN ULTRA-HIGH VACUUM THERMOBALANCE FOR LANGMUIR VAPORIZATION STUDIES VAPOR PRESSURE OF MOLYBDENUM,
by R. Jay Fries. Nov 65, 22p
Contract W-7405-ENG-36

Descriptors: (*Molybdenum, Vapor pressure), (*Heat of vaporization, Vacuum apparatus).

NBS-TN-270-2 **Field 7D, 20M**
CFSTI Prices: HC$0.40 MF$0.75
National Bureau of Standards, Washington, D. C.
SELECTED VALUES OF CHEMICAL THERMODYNAMIC PROPERTIES. PART II. TABLES FOR THE ELEMENTS TWENTY-THREE THROUGH THIRTY-TWO IN THE STANDARD ORDER OF ARRANGEMENT,
by D. D. Wagman, W. H. Evans, I. Halow, V. B. Parker, and S. M. Bailey. 6 May 66, 70p
Available from Superintendent of Documents, Government Printing Office, Washington, D. C., 20402 $0.40 as C13.46:270-2

Descriptors: (*Chemicals, Thermal properties), (*Thermodynamics, Tables), (*Thermochemistry, Tables), Silicon, Germanium, Tin, Lead, Boron, Aluminum, Callium, Indium, Thallium, Enthalpy, Entropy, Heat of formation, Specific heat.

Identifiers: Heat capacity.

The Note contains revised tables covering the elements silicon, germanium, tin, lead, boron, aluminum, gallium, indium, and thallium, and compounds of these elements following the Standard Order of Arrangement. The data given includes enthalpy, Gibbs energy of formation, entropy, and heat capacity. Tables for the first twenty-three elements and their compounds, and a discussion of the symbols, conventions, units of energy, and conversion factors used in this series are given in National Bureau of Standards Technical Note 270-1 (GPO Order No. C13.46:270-1).

N66-14482 **Field 7D**
CFSTI Prices: HC$2.00 MF$0.50
National Bureau of Standards, Washington, D. C.
ELECTROCHEMICAL DATA, PART I.
Quarterly rept. 1 Oct-31 Dec 65,
by W. J. Hamer. 1965, 32p
Contract NASA Order R-09-022-029
NASA-CR-62024

Descriptors: *Standard, *Conversion table, *Electrochemistry.

N66-15778 **Field 7D**
CFSTI Prices: HC$3.00 MF$0.75
Oklahoma State Univ., Stillwater. Dept. of Physics.
SURFACE PARAMETERS OF STANNIC OXIDE IN POWDER, CERAMIC, AND GEL FORM BY NITROGEN ABSORPTION TECHNIQUES.

Interim rept.
by C. M. Cunningham, E. E. Kohnke, and J. L. Rutledge. Dec 65, 74p SS-2
Grant NsG-609
NASA-CR-69548

Descriptors: *Adsorption, *Ceramics, *Isotherm, *Oxide, *Powder, *Surface property, *Gel.

PB-169 657 **Field 7D**
CFSTI Price: HC$4.60
RAND Corp., Santa Monica, Calif.
HEAT TRANSFER IN A DISSOCIATING GAS,
by Phyllis Griefinger. 28 Aug 58, 46p RM-2244
AD230 074

Descriptors: (*Gases, Dissociation), (*Heat transfer, Gases), Chemical reactions, Diffusion, Differential equations.

An evaluation was conducted of the effects of finite reaction kinetics on heat transfer. The model considered is a chemically reacting gas confined between two plates maintained at different temperatures. The specific type of chemical reaction investigated is the dissociation-recombination reaction X2±2X. Heat transfer is found to be sensitive to the values of G (2) (proportional to the ratio of the volume reaction rate to the diffusion rate) and Beta (proportional to the ratio of cold-wall efficiency in causing atom recombination to the particle mean free path between the plates divided by the separation plates), provided that neither parameter is too large. The heat transfer approaches its equilibrium value for either G (2) to oo or Beta to oc.

PB-169 910 **Field 7D, 12A, 20M**
CFSTI Prices: HC$1.10 MF$0.50
Wisconsin Univ., Madison. Theoretical Chemistry Inst.
ON THE VALIDITY OF THE DENSITY EXPANSION SOLUTION OF THE BBGKY EQUATIONS,
by Frank C. Andrews. 1 Apr 66, 7p WIS-TCI-167
Grant NSF-G20725

Descriptors: (*Kinetic theory, Equations), Density, Equations, Particles, Gases, Transport properties, Series.

There are severe restrictions on the validity of the standard density expansion of the BBGKY hierarchy. The usual expression for F sub 2 is incorrect at all orders, resulting in the divergences suspected in higher order terms. (Author)

RFP-599 **Field 7D**
CFSTI Prices: HC$1.00 MF$0.50
Rocky Flats Div., Dow Chemical Co., Golden, Colo.
THE IMPURITY ANALYSIS OF PLUTONIUM PEROXIDE AND PLUTONIUM FLUORIDE,
by A. J. Johnson, and E. Vejvoda. 4 Feb 66, 12p
Contract AT (29-1)-1106

Descriptors: (*Plutonium compounds, Peroxides), (*Fluorides, Plutonium compounds).

SC-RR-65-569 **Field 7D, 18J**
CFSTI Prices: HC$3.00 MF$0.75
Sandia Corp., Albuquerque, N. Mex.
THE COMBUSTION AND EXPLOSION OF ZIRCONIUM DROPLETS IGNITED BY FLASH HEATING,
by L. S. Nelson. Jan 66, 58p
Contract AT (29-1)-789

Descriptors: (*Zirconium, Combustion), (*Liquid metals, Drops).

UCRL-14359 **Field 7D, 18D, 14B**
CFSTI Prices: HC$1.00 MF$0.50
Lawrence Radiation Lab., Univ. of California, Livermore.
APPARATUS FOR AUTOMATIC PREPARATIVE GAS CHROMATOGRAPOHY,
by J. W. Frazer, an C. J. Morris. 6 Dec 65, 21p
Contract W-7405-eng-48

Descriptors: (*Chemical compounds, Chromatographic analysis), (*Chromatographic analysis, Temperature control).

UCRL-16514 **Field 7D, 20K**
CFSTI Prices: HC$2.00 MF$0.50
Lawrence Radiation Lab., Univ. of California, Berkeley.
VAPOR PRESSURE OF LEAD AND ACTIVITY MEASUREMENTS ON LIQUID LEAD-TIN ALLOYS BY THE TORSION EFFUSION METHOD.
Master's thesis,
by Donald Thomson Hawkins. Jan 66, 30p
Contract W-7405-ENG-48

Descriptors: (*Lead, Vapor pressure), (*Liquid metals, Torsion).

AD-419 846 **See Field 20C**

AD-421 573 **See Field 20L**

AD-445 978 **See Field 21B**

AD-449 958 **See Field 11F**

AD-461 088 **See Field 10B**

AD-461 362 **See Field 10B**

AD-466 458 **See Field 21H**

AD-467 436 **See Field 15B**

AD-469 073 **See Field 11I**

AD-477 649 **See Field 14B**

AD-634 148 **See Field 5A**

AD-634 235 **See Field 14B**

AD-634 241 **See Field 10B**

AD-634 277 **See Field 21I**

AD-634 317 **See Field 11K**

AD-634 340 **See Field 20J**

AD-634 430 **See Field 14B**

AD-634 627 **See Field 20B**

AD-634 645 **See Field 20L**

PB-169 807 **See Field 17B**

RFP-643 **See Field 20B**

RFP-644 **See Field 18D**

RFP-688 **See Field 7B**

Y-1532 **See Field 18B**

7E. RADIO AND RADIATION CHEMISTRY

AD-434 216 **Field 7E, 11E, 11I, 11J**
CFSTI Price: HC$3.60
Naval Air Engineering Center, Philadelphia, Pa. Aeronautical Materials Lab.
MOLECULAR CHANGES IN POLYAMIDE AND ELASTOMERIC POLYMERS DUE TO NUCLEAR, ULTRAVIOLET AND THERMAL RADIATION.
Final rept.,
by G. Hargreaves. 15 Dec 63, 39p
Proj. NAEC-AML (16)-R360FR101

Descriptors: (*Polyamide plastics, Radiation damage), (*Elastomers, Radiation damage), (*Nylon, Radiation damage), Gamma rays, Ultraviolet radiation, Thermal radiation, Molecular properties, Viscosity, Melting point, Spectra (Infrared), Spectra (Visible + ultraviolet), Microstructure, Tensile properties, Molecular structure, Chemical bonds, Crystal structure.

The object of the investigation was to determine the molecular changes in polyamide and elastomeric polymers due to nuclear, ultraviolet, and thermal radiation. Several types of nylon fibers were exposed to gamma, ultraviolet and thermal radiation and different atmospheric conditions. The unexposed and exposed specimens were examined by the following techniques for the purpose of obtaining information concerning the physical and chemical changes in the structure of the polymer; viscosity of solutions, melting point, infrared spectra, ultraviolet absorption, and microscopy. The tensile strength was measured in some instances. Results show that no one method gives a complete picture, but the combined results from many methods give some insight into the molecular changes taking place as a result of irradiation. Some of these changes are: (1) the molecules break at the C-N bonds creating smaller molecules and appreciable changes in the physical state, (2) the degree of crystallinity changes. The ultraviolet resistance of some nylons is improved by small doses of gamma irradiation. (Author)

AD-463 222 **Field 7E, 18G**
CFSTI Price: HC$1.60
Naval Radiological Defense Lab., San Francisco, Calif.
A RAPID METHOD FOR THE CARRIER-FRE DETERMINATION OF INDIVIDUAL RARE EARTHS BY ION EXCHANGE AT ROOM TEMPERATURE,
by S. C. Foti, and L. Wish. 29 Jan 65, 15p
USNRDL-TR-836

Descriptors: (*Fission products, Separation), (*Rare earth elements, Ion exchange), (*Ion exchange, Rare earth elements), Radiactive isotopes, Yttrium, Terbium, Gadolinium, Europium, Samarium, Promethium, Neodymium, Praseodymium, Cerium, Lanthanum, Ion exchange resins.

A rapid procedure was devised for the quantitative recovery of the individual rare earth elements and yttrium from a synthetic mixture of carrier-free yttrium, terbium, gadolinium, europium, samarium, promethium, neodymium, praseodymium, cerium and lanthanum radionuclides. The separations are accomplished in 14 hours by elution from a Dowex 50W-X4 resin column with alpha-hydroxyisobutyrate solutions at room temperature. (Author)

AD-634 415 **Field 7E, 6H**
CFSTI Prices: HC$1.00 MF$0.50
Army Foreign Science and Technology Center, Washington, D. C.
EFFECT OF HIGH DOSES OF GAMMA RAYS OF Co60 ON POTATO STARCH,
by S. E. Traubenberg, K. A. Korotchenko, and I. N. Putilova.Jun 66, 12p FSTC-HT-23-106-66 TT-66-61515
Trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Pishchevaya Tekhnologiya (USSR) n6 p24-8 1965.

Descriptors: (*Starches, Radiation chemistry), Potatoes, Gamma rays, Dosage, USSR, Cobalt, Free radicals.

Experimental data are presented on high dosage irradiation of potato starch using Co60. Doses up to 94 Mrad were used and dissociation products were analyzed. Free radicals were found to exist for extended periods in irradiated potato starch. (Author)

AD-634 651 **Field 7E**
CFSTI Prices: HC$1.00 MF$0.50
Army Natick Labs., Mass.

LIGHT ATTENUATION BY PHOTOCHEMICAL MEANS: PHOTOCHROMISM,
by Julius Weinstein, Aaron L. Bluhm, Margaret E. Langmuir, and E. Thomas Strom. Jun 66, 14p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Photochromism, Chemistry), (*Organic nitrogen compounds, Photochromism), Nitrobenzenes, Pyridines, Molecular structure, Reaction kinetics, Thermochemistry, Aromatic compounds, Molecular isomerism, Free radicals, Photochemistry.

It was found that the photochromism of 2- (2,4-dinitrobenzyl)pyridine is not limited to this compound, but is the common property of a class of aromatic nitro compounds which possesses certain structural characteristics: the presence of a nitro and a methenyl group ortho to each other. Solvents were found to have a marked effect on the rate of the fading reactions; As were substituents in the para position of the aromatic ring of o-nitrobenzylpyridines. It was found that on irradiation with ultraviolet light, 3,3'-dinitro-4,4'-di (2-pyridylmethyl)azoxybenzene undergoes simultaneously aci-nitro-nitro tautomerization and geometrical isomerization. A new class of photochromic nitro compounds was discovered. The essential structural requirement for photochromism in these 1-aryl-2-nitroalkenes is that the nitro and phenyl groups bear a cis relationship with respect to each other. It was shown that some of the simpler o-nitrobenzyl compounds, such as o-nitroluene, are not only photochromic, but give relatively stable free radicals when irradiated with ultraviolet light. These radicals were identified as phenyl nitroxides. (Author)

AD-634 693 **Field 7E**
CFSTI Prices: HC$1.00 MF$0.50
Army Nuclear Defense Lab., Edgewood Arsenal, Md.
OBSERVATION OF SHORT-LIVED SPECIES PRODUCED BY X-RAY PULSES,
by Nathan Klein. Jun 66, 12p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Radiation chemistry, *X rays), (*Water, Radiation chemistry), (*Electrons, Radiation chemistry), Hydrates, Chemical reactions, Reaction kinectics, Carbonates.

A report is given on studies concerning the reactions of the hydrated electron during and immediately after an x-radiation pulse.

AEC-TR-6520 **Field 7E, 11I, 20L**
CFSTI Prices: HC$7.32 MF$2.00
ANNUAL REPORT OF THE JAPANESE ASSOCIATION FOR RADIATION RESEARCH ON POLYMERS, VOLUME 4, 1962.
Translation of Nippon Hoshasen Kobunshi Kenkyu Kyokai Nempo, Vol. 4, 1962.
1962, 444p

Descriptors: (*Radiation chemistry, Plastics), (*Plastics, Solid state physics).

For abstract, see T 66 15.

ANL-7096 **Field 7E, 18B, 20H**
CFSTI Prices: HC$1.00 MF$0.50
Argonne National Lab., Ill.
ADDITIONAL YIELD DATA FOR TRANSPLUTONIUM ELEMENT PRODUCTION IN THERMAL REACTORS,
by J. Milsted, E. S. Macias, R. W. Anderson, and D. L. Stewart. 11 Oct 65, 13p
Contract W-31-109-eng-38

Descriptors: (*Thermal reactors, Plutonium), (*Reactor fuel elements, Neutron flux).

BNL-949 **Field 7E, 18B**
CFSTI Prices: HC$3.00 MF$0.75
Brookhaven National Lab., Upton, N. Y.
PROCESS RADIATION DEVELOPMENT PROGRAM SUMMARIES. ANNUAL CONTRACTORS MEETING (5th), OCTOBER 7-8, 1965.
1965, 95p CONF-651064
Contract AT-30-2-GEN-16

Descriptors: (*Radiation chemistry, Nuclear industrial applications), (*Nuclear industrial applications, Radioactive isotopes).

BNWL-113-12 **Field 7E, 18H, 6R, 11F K**
CFSTI Prices: HC$2.00 MF$0.50
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
PLUTONIUM ABSTRACTS. VOLUME 5, NUMBER 12.
31 Jan 66, 39p
Contract AT (45-1)-1830

Descriptors: (*Plutonium, Abstracts), (*Abstracts, Processing).

BNWL-113-13 **Field 7E, 18H, 6R, 11F K**
CFSTI Prices: HC$2.00 MF$0.50
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
PLUTONIUM ABSTRACTS. VOLUME 6, NUMBER 1.
28 Feb 66, 37p
Contract AT (45-1)-1830

Descriptors: (*Plutonium, Abstracts), (*Abstracts, Processing).

BNWL-113-14 **Field 7E, 7B, 7C**
CFSTI Prices: HC$2.00 MF$0.50
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
PLUTONIUM ABSTRACTS. VOLUME 6, NUMBER 2.
31 Mar 66, 41p
Contract AT (45-1)-1830

Descriptors: (*Plutonium compounds, Abstracts).

For abstract, see N 20 13.

BNWL-36 **Field 7E, 6R, 18H, 18D K**
CFSTI Prices: HC$8.71 MF$2.00
Battelle-Northwest, Richland, Wash. Pacific Northwestprogress Lab.
HANFORD RADIOLOGICAL SCIENCES RESEARCH AND DEVELOPMENT ANNUAL REPORT FOR 1964,
by D. W. Pearce, and J. K. Green. Jan 65, 571p
Contract AT (45-1)-1830

Descriptors: (*Radiation chemistry, Tracer studies), (*Radiobiology, Scientific research).

CONF-571-37 **Field 7E**
CFSTI Prices: HC$1.00 MF$0.50
Camille Dreyfus Lab., Research Triangle Inst., Durham, N. C.
THE RADIATION POLYMERIZATION OF CRYSTALLINE TRITHIANE,
by J. B. Lando, and V. Stannett. Nov 64, 18p
Contract AT (40-1)-2513
Prepared for presentation to American Chemical Society National Meeting (148th), Chicago, Aug-Sep, 1964.

Descriptors: (*Radiation chemistry, Polymerization), (*S-heterocyclic compounds, Crystal structure).

DP-1034 **Field 7E, 7A**
CFSTI Prices: HC$1.00 MF$0.50
Du Pont De Nemours (E.I.) and Co., Aiken, S. C. Savannah River Lab.
EVALUATION OF COMMERCIAL N-PARAFFIN MIXTURES FOR PUREX DILUENT.
by Richard N. Wilhite. Feb 66, 7p
Contract AT (07-2)-1

Descriptors: (*Waxes, Solvent extraction), (*Absorption, Waxes).

Identifiers: Purex diluent.

HASL-168 **Field 7E, 18H**
CFSTI Prices: HC$6.00 MF$1.25
Isotopes, Inc., Westwood, N. J.
FLIGHT DATA AND RESULTS OF RADIOCHEMICAL ANALYSES OF FILTER SAMPLES COLLECTED DURING 1963. APPENDIX TO PROGRESS REPORT NO. 11 ON PROJECT STARDUST,
by Herbert W. Feely, James P. Friend, Raymond J. Lagomarsino, John E. Hardaway, and Donald C. Bogen. 1 Dec 65, 233p
Contract DA-49-146-XZ-079

Descriptors: (*Air pollution, Radioactive fallout), (*Radiological contamination, Chemical analysis).

Identifiers: Stardust project.

HASL-169 **Field 7E, 18H**
CFSTI Prices: HC$4.00 MF$1.00
Isotopes, Inc., Westwood, N. J.
FLIGHT DATA AND RESULTS OF RADIOCHEMICAL ANALYSES OF FILTER SAMPLES COLLECTED DURING 1964. PROGRESS REPORT NO. 12 ON PROJECT STARDUST,
by Herbert W. Feely, Donald C. Bogen, Raymond J. Lagomarsino, John E. Hardway, and Micah W. M. Leo. 1 Jan 66, 143p
Contract DA-49-146-XZ-079

Descriptors: (*Air pollution, Radioactive fallout), (*Radiological contamination, Chemical analysis).

Identifiers: Stardust project.

MLM-1268 **Field 7E, 18B**
CFSTI Prices: HC$2.00 MF$0.50
Mound Lab., Miamisburg, Ohio.
MOUND LABORATORY PROGRESS REPORT FOR JUNE 1965,
by J. F. Eichelberger, G. R. Grove, and L. V. Jones
21 Jun 65, 37p
Contract AT (33-1)-GEN-53

Descriptors: (*Radiation chemistry, Instrumentation), (*Radiochemistry laboratories, Scientific reports).

NBL-230 **Field 7E, 18J**
CFSTI Prices: HC$3.00 MF$0.75
New Brunswick Lab. (AEC), N. J.
ANNUAL PROGRESS REPORT FOR THE PERIOD JULY 1964 THROUGH JUNE 1965.
Dec 65, 87p

Descriptors: (*Reactor materials, Radiochemistry), (*Boron, Impurities).

ORNL-3900 **Field 7E, 6R, 18B, 20H K**
CFSTI Prices: HC$6.00 MF$1.25
Oak Ridge National Lab., Tenn.
ANNUAL REPORT, 1964.
1966, 208p
Contract W-7405-ENG-26

Descriptors: (*Nuclear engineering, Reactor materials), (*Nuclear physics, Radiobiology).

ORNL-3913 **Field 7E, 20B, 18I**
CFSTI Prices: HC$5.00 MF$1.00
Oak Ridge National Lab., Tenn.

REACTOR CHEMISTRY DIVISION ANNUAL PROGRESS REPORT FOR PERIOD ENDING DECEMBER 31, 1965.
Mar 66, 160p
Contract W-7405-eng-26

Descriptors: (*Nuclear reactors, Chemistry), (*Chemical reactions, Nuclear physics).

For abstract, see N 20 13.

PB-169 891 **Field 7E, 18J**
CFSTI Prices: HC$3.60 MF$0.50
Commissariat a l'Energie Atomique, Fontenay-Aux-Roses (France). Centre d'Etudes Nucleaires.
REACTION AVEC L'AZOTE DES CARBURES D'URANIUM ET DE PLUTONIUM (Reaction of Uranium and Plutonium Carbides with Nitrogen),
by Robert Lorenzelli, Andre Martin, and Roger Schickel.Mar 66, 31p CEA-R-2997
Text in French; Attached Summary in English.

Descriptors: (*Uranium compounds, Chemical reactions), (*Plutonium compounds, Chemical reactions), (*Nitrogen, Uranium compounds), Reactor fuel processing, Grinding, Carbides, Contamination, Sintering, France.

Identifiers: Nitridation, Plutonium carbides, Plutonium nitrides, Uranium carbides, Uranium nitrides.

Uranium and plutonium carbides react with nitrogen during the grinding process preceeding the final sintering. The reaction occurs even in argon atmospheres containing a few percent of residual nitrogen. The resulting contamination is responsible for the appearance of an equivalent quantity of higher carbide in the sintered products; nitrogen remains quantitatively in the monocarbide phase. UC can be transformed completely into nitride under a nitrogen pressure, at a temperature as low as 400 C. The reaction is more sluggish with PuC. The following reactions take places: UC plus 0.8 N2 to UN1.60 plus C; PuC plus 0.5 N to PuN plus C. (Author)

PB-170 541 **Field 7E, 18F, 18G, 18H**
CFSTI Prices: HC$12.60 MF$0.75
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
INSTALLATION DE CHIMIE ANALYTIQUE SOUS RAYONNEMENT (Installation for Analytic Chemistry Under Irradiation),
by Jean Fradin, Pierre Azoeuf, and Andre Guillon.
May 66, 116p CEA-R-2887
Text in French; Attached summary in English.

Descriptors: (*Radiochemistry laboratories, Remote control systems), (*Radioactive isotopes, Chemical analysis), Radioactive waste, Installation, Radioactivity, Laboratory equipment.

An installation has been set up for carrying out manipulations and chemical analyses on radio-active products. It is completely remote-controlled and is of linear shape, 15 metres long; it is made up of three zones: (1) an active zone containing the apparatus, (2) a rear zone giving access to the active zone, (3) a forward zone independent of the two others and completely protected from which the remote-control of the apparatus is effected. The whole assembly has been designed so that each apparatus corresponding to an analytical technique is set up in a sealed enclosure. The sealed enclosures are interconnected by a conveyor. After three years operation, a critical review is now made of the installation.

AD-634 645 **See Field 20L**

AD-634 661 **See Field 19A**

ALO-1355-1 **See Field 18D**

BNWL-213 **See Field 7A**

NYO-3396-3 **See Field 6C**

PB-169 894 **See Field 20F**

Y-1532 **See Field 18B**

8A. BIOLOGICAL OCEANOGRAPHY

PB-170 332 **See Field 5C**

8B. CARTOGRAPHY

AD-634 285 **Field 8B, 14E**
CFSTI Prices: HC$1.00 MF$0.50
Army Foreign Science and Technology Center, Washington, D. C.
ON THE RESULTS OF THE ALL-UNION CONFERENCE ON AERIAL SURVEYS (9th),
by P. Ya. Raizer. Jun 66, 13p FSTC-HT-23-84-66
Proj. 2301-6553
TT-66-61501
Trans. of Geodeziya i Kartografiya (USSR) n11 p3-8 1965.

Descriptors: (*Aerial photography, Surveying), (*Surveying, Symposia), USSR, Airborne, Photogrammetry, Mapping, Engineering geology.

The Ninth All-Union Conference on Aerial Surveys was held at Leningrad in March 1965 under the auspices of the Interdepartmental Commission on Aerial Surveys of the Academy of Sciences USSR. More than 700 delegates attended, and 160 papers and communications were read at the section sessions and 18 papers at the plenary sessions. The sections were seven in number: aerial, surveying and photogrammetry, geographical surveys, geological surveys, geophysical surveys, soils and geobotanical surveys, engineering geology, and engineering surveys. Only some of the 'most interesting papers' on aerial photography and photogrammetry are discussed. (Author)

AD-634 284 **See Field 14B**

AD-634 501 **See Field 3B**

PB-169 495 **See Field 13B**

8C. DYNAMIC OCEANOGRAPHY

AD-469 995 **Field 8C, 12A**
CFSTI Prices: HC$19.00 MF$1.25
Marine Advisers, Inc., La Jolla, Calif.
AN ELECTRIC ANALOGUE MODEL FOR THE STUDY OF LONG WAVES AND SEICHES IN CHESAPEAKE BAY.
Final rept. Jun 62-Jun 65,
by Joseph W. Joy. Jun 65, 140p
Contract DA-49-146-XZ-152
DASA-1678

Descriptors: (*Ocean waves, Chesapeake Bay), (*Chesapeake Bay, Ocean waves), (*Wafer waves, Simulation), Electrical networks, Analog systems, Two-dimensional flow, Propagation, Ocean currents.

Identifiers: Seiches.

The principal topic of this report concerns the design and use of a passive linear electrical network suitable for the analog simulation of two-dimensional propagation of non-dispersive water waves offshore and within Chesapeake Bay. The band of wave frequencies of interest lies above that of the tides. It should be made clear that this report does not contain an extensive catalogue of output from this analog model. What is included here is intended only to give examples of some of the possible uses and types of output.

AD-634 242 **Field 8C, 9C, 20N**
CFSTI Prices: HC$5.00 MF$1.00
Department of the Navy, Washington, D. C.
THE RADIOOCEANOGRAPHIC INVESTIGATION OF SEA SWELLS,
by S. Ya. Braude. 1966, 158p Translation-2067
TT-66-61489
Radio Okeanograficheskie Issledovaniya Morskogo Volneniya, trans. of Akademiya Nauk SSSR. Institut Radiofiziki i Elektroniki, Kiev, 1962.

Descriptors: (*Ocean waves, Measurement), (*Radio equipment, *Oceanographic equipment), Water waves, Electromagnetic wave reflections, Radio waves, Frequency analyzers, USSR.

This symposium contains studies in which an attempt has been made to utilize the methods of modern radiophysics for investigating the processes of sea swells. The articles describe the apparatus used, the methods by which sea swells were studied, measurement data and the results of their analysis. This symposium is intended for radiophysicists and oceanographers working in the field of radiooceanography. (Author)

8E. GEODESY

AD-464 349 **Field 8E, 22D**
CFSTI Price: HC$8.60
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
ANALYSIS OF THE OBSERVATIONAL CONTRIBUTIONS TO THE ERRORS OF THE NAVY SATELLITE DOPPLER GEODETIC SYSTEM,
by W. H. Guier, R. R. Newton, and G. C. Weiffenbach.Jan 65, 81p TG-653
Contract NOw-62-0604-c

Descriptors: (*Geodesics, Satellites (Artificial)), (*Satellites (Artificial), Doppler effect), (*Doppler effect, Satellite networks), Radio signals, Errors, Tracking, Gravity, Troposphere, Atmospheric tracking, Scientific satellites.

Identifiers: ANNA, Tranet.

An analysis is made of the observational contributions to the total system error of the Navy's Satellite Doppler Geodetic System. Aside from the error imposed by the limited number of satellites available for analysis, which limits the complexity of the gravity field that can be used, it is concluded that the system error is about 10 meters for the observations from a single satellite pass, and is 5 meters or less for multiple passes.

AD-634 541 **Field 8E, 9B**
CFSTI Prices: HC$4.00 MF$0.75
International Business Machines Corp., Cambridge, Mass. Cambridge Space Systems Dept.
GEOID REPRESENTATION FROM SATELLITE-DETERMINED COEFFICIENTS.
Final technical rept. 7 Jun 65-7 Mar 66,
by A. Richa- d LeSchack. 7 Mar 66, 124p
Contract DA-44-009-AMC-1146 (X)
Task 6.11.30.01.1-004

Descriptors: (*Geodesics, *Programming (Computers)), Mapping, Astronomical geodesics, Satellite tracking systems, Position finding, Numerical methods and procedures.

Identifiers: FORTRAN, IBM 7094.

This report describes the mathematical formulations and programs developed to provide a spatial representation of a geopotential surface, based on a set of geopotential harmonic coefficients determined by an investigator from a study of satellite motion. The component parts of the problem are analyzed and discussed in detail, and the mathematical techniques for accomplishing the various objectives are presented. These techniques have

been verified by hand computations and by computer programs, and have been implemented in the form of two FORTRAN IV programs for the IBM 7094 Computer. Complete instructions for using the programs, as well as program documentation, are included. (Author)

AD-634 679 **Field 8E, 9B**
CFSTI Prices: HC$1.00 MF$0.50
Research Inst. for Geodetic Sciences, Fort Belvoir, Va.
A GEOMETRIC SIMULTANEOUS MULTISTATION DETERMINATION, WITH CONSTRAINTS, USING DATA FROM GEODETIC SATELLITES,
by Lawrence A. Gambino. Jun 66, 16p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Geodesics, *Satellite tracking systems), (*Position finding, Astronomical geodesics), Satellites (Artificial), Orbital trajectories, Optical tracking, Radar tracking, Matrix algebra, Least squares method, Geometry.

The optical and electronic data gathered from observations on geodetic satellites can be used in a simultaneous determination of all points on a trajectory along with the determination of the three dimensional coordinates of ground stations. Unlike other reductions in which the equations from all ground stations to a single trajectory point would be performed in a stepwise fashion, the procedure to be outlined assumes that the individual trajectory points are not mutually independent quantities. With this approach, a simultaneous, multistation, least square solution is performed. The entire matrix treatment of the multistation problem is not presented in this paper. Instead, much of the development is a heuristic treatment of the problem.

AD-634 240 **See Field 20N**

AD-634 284 **See Field 14B**

8F. GEOGRAPHY

PNE-444 **Field 8F**
CFSTI Prices: HC$5.00 MF$1.00
Atomic Energy Commission, Cambridge, Mass. Project Chariot.
A HUMAN GEOGRAPHICAL STUDY IN NORTHWEST ALASKA.
Final rept.
by Don Charles Foote. Jun 61, 157p
Contract AT (04-3)-315

Descriptors: (*Alaska, Geography), (*Humans, Alaska).

For abstract, see T 66 15.

TID-22499 **Field 8F, 18B**
CFSTI Prices: HC$2.00 MF$0.50
Savannah River Ecology Lab., Aiken, S. C.
DEVELOPMENT OF A 137 CS FACILITY FOR ECOLOGICAL RESEARCH,
by Frank B. Golley, and J. Frank McCormick. Jan 66, 27p
Prepared in cooperation with North Carolina Univ., Chapel Hill. Dept. of Botany.

Descriptors: (*Ecology, Radioactive isotopes), (*Radioactive isotopes, Cesium).

For abstract, see N 20 12.

AD-634 376 **See Field 5C**

AD-634 471 **See Field 8L**

PB-170 052 **See Field 5C**

PB-170 217 **See Field 5C**

PB-170 219 **See Field 5C**

PB-170 221 **See Field 5C**

PB-170 222 **See Field 5C**

PB-170 227 **See Field 5C**

PB-170 230 **See Field 5C**

PB-170 231 **See Field 5C**

PB-170 232 **See Field 5C**

PB-170 233 **See Field 5C**

PB-170 234 **See Field 5C**

PB-170 235 **See Field 5C**

PB-170 237 **See Field 5C**

PB-170 238 **See Field 5C**

PB-170 240 **See Field 5C**

PB-170 246 **See Field 5C**

PB-170 249 **See Field 5C**

PB-170 251 **See Field 5C**

PB-170 254 **See Field 5C**

PB-170 255 **See Field 5C**

PB-170 256 **See Field 5C**

PB-170 257 **See Field 5C**

PB-170 258 **See Field 5C**

PB-170 259 **See Field 5C**

PB-170 260 **See Field 5C**

PB-170 261 **See Field 5C**

PB-170 268 **See Field 5C**

PB-170 270 **See Field 5C**

PB-170 273 **See Field 5C**

PB-170 274 **See Field 5C**

PB-170 276 **See Field 5C**

PB-170 278 **See Field 5C**

PB-170 279 **See Field 5C**

PB-170 280 **See Field 5C**

PB-170 281 **See Field 5C**

PB-170 282 **See Field 5C**

PB-170 284 **See Field 3C**

PB-170 285 **See Field 5C**

PB-170 293 **See Field 5C**

PB-170 298 **See Field 5C**

PB-170 302 **See Field 5C**

PB-170 310 **See Field 5C**

PB-170 311 **See Field 5C**

PB-170 312 **See Field 5C**

PB-170 314 **See Field 5C**

PB-170 316 **See Field 5C**

PB-170 318 **See Field 5C**

PB-170 319 **See Field 5C**

PB-170 320 **See Field 5C**

PB-170 321 **See Field 5C**

PB-170 328 **See Field 5C**

PB-170 332 **See Field 5C**

PB-170 335 **See Field 5C**

PB-170 337 **See Field 5C**

PB-170 339 **See Field 5C**

PB-170 340 **See Field 5C**

8G. GEOLOGY AND MINERALOGY

AD-634 380 **Field 8G, 4A**
CFSTI Prices: HC$1.00 MF$0.50
Directorate of Scientific Information Services, Ottawa (Ontario).
MODELING THE TUNGUS METEORITE EXPLOSION,
by I. T. Zotkin, and M. A. Cikulin. May 66, 7p T-458-R
TT-66-61511
Trans. of Akademiya Nauk SSSR. Doklady, v167 n1 p59-62 1966.

Descriptors: (*Meteorites, USSR), Extraterrestrial topography, Impact shock, Cratering, Surface area, Earth (Planet), Models (Simulations), Damage, Plants (Botany).

Identifiers: Tunguska catastrophe.

As a result of expeditionary operations from 1958 to 1965, a chart has been compiled of the stricken forest in the region of the Tungus meteorite fall, establishing the outline of the destruction region and the directions in which the trees were blown down at different points. Over an area totalling 2200 sq km, the azimuths of about 40,000 tree trunks blown down on the 30th of June, 1908, have been determined by field studies. The character of the Tungus tree-fall leaves no doubt that it was produced by a powerful air wave with an energy of the order of 40 to the 23rd power ergs, the source of which was at some height above the earth. (Author)

BNWL-243 **Field 8G, 8I**
CFSTI Prices: HC$1.00 MF$0.50
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
SOIL SURVEY. HANFORD PROJECT IN BENTON COUNTY, WASHINGTON,
by B. F. Hajek. Apr 66, 19p
Contract AT (45-1)-1830

Descriptors: (*Soils, Washington (State)).

For abstract, see N 20 13.

N66-14557 **Field 8G**
CFSTI Prices: HC$3.00 MF$0.75
California Univ., La Jolla.
SURFACE CONDITIONS OF THE ORGUEIL METEORITE PARENT BODY AS INDICATED BY MINERAL ASSOCIATIONS,
by K. Bostrom, and K. Fredriksson. 1965, 64p
Grants NSG-317-63, NSG-688
NASA-CR-69097
Prepared in cooperation with National Science Foundation Grants NSF G-12325, NSF B-8069.

Descriptors: *Meteorite, *Mineral, *Orgueil meteorite.

AD-854 286 See Field 8K

PB-170 276 See Field 5C

8H. HYDROLOGY AND LIMNOLOGY

AD-634 637 Field 8H, 13B
CFSTI Prices: HC$1.00 MF$0.50
Army Engineer District, Detroit, Mich.
MODIFICATION OF NEARSHORE CURRENTS BY COASTAL STRUCTURES,
by James H. Saylor. Jun 66, 14p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Great Lakes, *Lake waves), Wind, Water waves, Harbors, Beaches, Sedimentation, Erosion, Hydrographic surveying, Civil engineering.

This paper describes and presents the results of water current studies conducted along the shores of Lakes Superior, Michigan, and Erie. The studies have been made at harbor locations with the purpose of establishing current magnitudes and patterns within the harbors and in the adjacent coastal areas, and relating the measured currents with the causative forces.

PB-170 284 See Field 3C

8I. MINING ENGINEERING

AD-634 414 See Field 19A

PB-170 328 See Field 5C

8J. PHYSICAL OCEANOGRAPHY

AD-462 328 Field 8J
CFSTI Price: HC$1.00
Little (Arthur D.), Inc., Cambridge, Mass.
PHYSICAL CHEMISTRY OF THE DEEP OCEAN ENVIRONMENT,
by R. A. Horne. 1 May 65, 22p Technical rept. TR-11
Contract Nonr-4424 (00)
Proj. NR-051-460
Prepared for presentation at the Marine Sciences and Research Section of the U. S. Navy Symposium on Military Oceanography (2nd), Washington, D. C. May 1965.

Descriptors: (*Sea water, Physical chemistry), (*Ocean models, Physical chemistry), Water, Molecular association, Electrolytes, Sodium compounds, Chlorides, Magnesium compounds, Sulfates, Pressure, Electrical conductance, Ions, Hydrates, Viscosity, Corrosion, Theory, Electrostriction.

The results of some simple experiments performed over recent years in a simulated deep ocean environment are reviewed.

AD-634 255 Field 8J, 15A
CFSTI Prices: HC$3.00 MF$0.75
Travelers Research Center, Inc., Hartford, Conn.
STUDIES OF TECHNIQUES FOR THE ANALYSIS AND PREDICTION OF TEMPERATURE IN THE OCEAN. PART III. AUTOMATED ANALYSIS AND PREDICTION.
Interim rept.,
by Albert Thomasell Jr, Russell G. Harris, and James G. Welsh. Jun 66, 98p Rept. no. 7421-213
Contract N62306-1675

Descriptors: (*Bathythermograph data, *Data processing systems), (*Atlantic Ocean, Temperature), Climatology, Oceans, Thermal properties, Mathematical prediction, Oceanographic data, Maps, Antisubmarine warfare.

A first-generation automated data processing system for analyzing and predicting sea-temperature fields to a depth of 400 ft in the western Atlantic has been developed. Several studies conducted to improve the forecast capability of the system indicate that the present forecast accuracy is limited by noise due to advection and internal waves. Subsequent forecast improvement requires a knowledge of the advection and internal wave processes and the development of techniques to exploit this knowledge. (Author)

AD-634 531 See Field 8L

AD-634 748 See Field 14E

8K. SEISMOLOGY

AD-444 492 Field 8K, 17J
CFSTI Price: HC$6.60
Michigan Univ., Ann Arbor. Inst. of Science and Technology.
SEISMIC-WAVE PROPAGATION FROM SALT-DOME ENVIRONMENTS,
by Changsheng Wu, and G. C. Phillips. Jul 64, 61p Rept. no. 4410-79-X
VESIAC State-of-the-Art Report.

Descriptors: (*Underground explosions, Seismic waves), (*Rock salt, Wave transmission), Tables, Fracture (Mechanics), Mechanics, Frequency, Spheres, Theory, Experimental data, Structural geology.

Buried explosions in salt domes generate seismic waves and fracture the medium in the region around the detonation. Results indicate that the mechanics and dynamics of fracturing are not quantitatively well known in detail. Seismic waves can be used to delineate the structural configuration of a salt dome. A continuous velocity log shows that the velocity in the salt is constant, while the velocity in the surrounding sediments varies with depth. It is suggested that the connection of salt domes with a single mother salt bed at depth may be tested by using the velocity contrast between the salt and sediments. Significant decoupling effects, obtained by detonating a chemical explosive in an underground spherical cavity, are examined. It is concluded that proper equations of motions are already known, and theoretical computed waveforms are in very good agreement with experimental results. The decoupling factor is a function of frequency. Information obtained from the chemical explosion indicates that similar favorable results seem possible for nuclear explosions. (Author)

AD-634 137 Field 8K
CFSTI Prices: HC$4.00 MF$1.00
Air Force Technical Applications Center, Washington, D. C. VELA Seismological Center.
MAGNITUDE DETERMINATION AT REGIONAL AND NEAR-REGIONAL DISTANCES IN THE UNITED STATES.
Technical rept.,
by Jack F. Evernden. 30 Aug 65, 145p VU-65-4A

Descriptors: (*Seismology, United States), Earthquakes, Underground explosions, Seismic waves, Propagation, Structural geology.

Identifiers: Vela-Uniform.

This report deals with the problems of variation of P sub n amplitudes in the regional and near-regional distance ranges (200-2100 kilometers). The data used were recorded by Long Range Seismic Measurement (LRSM) vans of the VELA Seismological Center as a result of earthquakes throughout the United States and numerous nuclear and chemical explosions in the same region. It is shown that the patterns of P sub n amplitudes versus delta in Western and Eastern United States (WUS and EUS) are markedly different and that these differences are related to different velocity structures in the two regions. These differences extend to at least 150 kilometers depth. Neither the WUS nor EUS patterns conform even approximately to that predicted or suggested by Gutenberg and Richter in the 1000-2000 kilometer range. The hypothesized shadow-zone does not exist and over-estimation of magnitude by as much as 1.5 magnitude units is frequently done because of failure to properly understand the patterns of radiation. By proper calibration of WUS by use of numerous events, it is now possible to get consistent estimates of magnitude at all distance ranges for most explosions and earthquakes. This is very important when body wave magnitudes are used as an essential element in an identification criterion. (Author)

AD-634 215 Field 8K
CFSTI Prices: HC$1.00 MF$0.50
Michigan Univ., Ann Arbor. Inst. of Science and Technology.
VESIAC MONTHLY BULLETIN OF VELA UNIFORM RESEARCH PUBLICATIONS.
15 Apr 66, 17p VESIAC Bull-39

Descriptors: (*Seismology, Bibliographies), Periodicals, Scientific research.

Identifiers: Vela-Uniform.

For abstract, see T 66 15.

AD-634 233 Field 8K, 9B
CFSTI Prices: HC$8.60 MF$0.75
Lincoln Lab., Mass. Inst. of Tech., Lexington.
A FREQUENCY-DOMAIN SYNTHESIS PROCEDURE FOR MULTIDIMENSIONAL MAXIMUM-LIKELIHOOD PROCESSING OF SEISMIC ARRAYS.
Technical note,
by Jack Capon, Roy J. Greenfield, and Robert J. Kolker. 6 May 66, 86p TN-1966-29
Contract AF 19 (628)-5167, ARPA order-512
ESD-TR-66-203

Descriptors: (*Seismology, *Data processing systems), Seismic waves, Sampling, Numerical methods and procedures, Programming (Computers).

Identifiers: Maximum likelihood, FORTRAN, Frequency-domain method.

A frequency-domain synthesis method for multidimensional maximum-likelihood filtering of sampled data obtained from seismic arrays is presented. This procedure is shown to possess several advantages relative to the time-domain synthesis technique. The primary advantage is that the frequency-domain method requires approximately ten times less computer time to synthesize the filter than does the time-domain technique. The details of a direct segment method for the spectral matrix estimation required in the frequency-domain approach are presented. In addition, the bias, variance, mean square error, limiting distribution, and other properties of the spectral estimates are discussed. The details of a Fortran IV computer program implementation of the frequency-domain method are given. The experimental results obtained by processing two events recorded at the Large Aperture Seismic Array are presented as well as a comparison of the performance of the frequency-domain method relative to the time-domain synthesis technique. It is found that the processed noise power reduction for the frequency-domain method is typically about two out of a total of 20 db worse than that of the time-domain technique. (Author)

AD-634 286 Field 8K, 8G
CFSTI Prices: HC$2.00 MF$0.50
Yale Univ., New Haven, Conn. Kline Geology Lab.
ANELASTIC PROPERTIES OF THE EARTH.
Technical rept.,

by Robert B. Gordon, and Carl W. Nelson. Apr 66, 42p TR-3
Contract Nonr-609 (54)
Proj. RR-007-01-01

Descriptors: (*Seismic waves, Attenuation), (*Earth (Planet), *Internal friction), (*Acoustics, Earth (Planet)), Mechanical waves, Damping, Solid state physics, Geophysics.

Known mechanisms of internal friction in crystalline materials are examined to find which are likely sources of seismic attenuation in the earth's mantle. Presently available laboratory data on rocks are not useful for this purpose because of the low temperatures and pressures at which they have been determined but experiments on sintered oxides indicate the important damping mechanisms at high temperature. The sources of seismic attenuation in the order of their probable importance are viscous grain boundary damping, stress-induced ordering, and dislocation damping. If any parts of the mantle are partially melted, stress-induced flow of fluid through intergranular channels may also cause attenuation. These damping mechanisms characteristically result in internal friction showing a strong frequency dependence. Scattering is almost certainly not an important source of seismic attenuation. The variation with depth of internal friction due to a thermally activated relaxation mechanism is found and it is shown that such a source of internal friction can account for existing data on the anelasticity of the earth. The low attenuation observed at depths below about 500 km can result from the effect of pressure in decreasing atomic mobility; the observed attenuation decrease is therefore not in itself evidence of a phase change. The relation between damping and the strength of the mantle is developed and it is shown that seismic attenuation data do not put useful bounds on this quantity. (Author)

AD-634 349 **Field 8K**
CFSTI Prices: HC$1.00 MF$0.50
Oregon State Univ., Corvallis. Dept. of Oceanography.
OREGON STATE UNIVERSITY SEISMOLOGICAL BULLETIN NO. 7 JANUARY 1 TO MARCH 31, 1965,
by A. J. Skorpen, J. N. Gallagher, and Peter Dehlinger. Apr 66, 19p Data rept. no. 22, Ref-66-5
Contracts AF 19 (628)-2778, Nonr-1286 (10)
See also AD-621 717.

Descriptors: (*Seismology, Periodicals), Seismological stations, Oregon, Universities, Seismographs, Seismic waves, Earthquakes, Tables, Geophysics.

The report includes seismic data recorded at the Corvallis, Klamath Falls, and Portland, Oregon, seismic stations from January 1 to March 31, 1965. (Author)

UCRL-14487 (REV.1) **See Field 18C**

8L. SNOW, ICE, AND PERMAFROST

AD-634 469 **Field 8L, 13B**
CFSTI Prices: HC$2.60 MF$0.50
Cold Regions Research and Engineering Lab., Hanover, Pa.
SNOW STUDIES AND OTHER OBSERVATIONS - OPERATION KING DOG, SONDRESTROM, GREENLAND.
Special rept.,
by Chester C. Langway Jr. Jul 59, 21p SR-31

Descriptors: (*Roads, Greenland), (*Transportation, Greenland), (*Snow, Trafficability), Snow vehicles, Terrain, Mobility, Arctic regions, Logistics.

Identifiers: King Dog operation.

The objective of Operation King Dog was twofold: (1) to select a winter access route from Sondrestrom Air Base over rough terrain, river and lake ice to the edge of the Greenland Ice Cap (SOTO); and (2) to decide upon the best possible route from the edge of the Ice Cap through the hummocky ablation zone and crevasse areas to the firm line and out onto the dry snow. This report presents a general description of the route and briefly discusses the results of observations along the trail.

AD-634 471 **Field 8L, 8F, 15G, 14B K**
CFSTI Prices: HC$5.00 MF$1.00
Cold Regions Research and Engineering Lab., Hanover, N. H.
COLD REGIONS RESEARCH AND DEVELOPMENT SYMPOSIUM, HANOVER, NEW HAMPSHIRE, MARCH 17-18, 1964.
Special rept.
Mar 64, 195p SR-80

Descriptors: (*Arctic regions, Symposia), (*Cold weather tests, Arctic regions), United States, USSR, Military strategy, Ice, Civil engineering, Water supplies, Snow, Trafficability, Multiband spectral reconnaissance.

Cold regions research program; Soviet capabilities in polar and arctic regions, Secret; Military problems in Alaska; Military problems in Greenland; CRREL's research program on visibility in cold regions environments; Some structural aspects of sea and lake ice; The military scientist in cold regions; Multiband sensing in cold regions environments; Glacier water supply and sewage disposal systems; Pile foundations in permafrost; Trafficability of snow and muskeg in northern areas.

AD-634 472 **Field 8L, 14B**
CFSTI Prices: HC$2.60 MF$0.50
Cold Regions Research and Engineering Lab., Hanover, N. H.
INSTRUCTIONS FOR MAKING AND RECORDING SNOW OBSERVATIONS.
Revised ed.
Jun 62, 22p Instruction Manual-1
Revision of manuscript submitted May 54.

Descriptors: (*Snow, Physical properties), Climatology, Distribution, Crystallography, Instrumentation, Instruction manuals.

The procedures for making snow observations as described in these instructions have been designed to provide information on the properties and physical features of the snow cover, their magnitude, distribution, and variability.

AD-634 531 **Field 8L, 8J, 17G**
CFSTI Prices: HC$2.00 MF$0.50
Naval Oceanographic Office, Washington, D. C. Oceanographic Prediction Div.
REPORT OF SEVERE ICE CONDITIONS IN MELVILLE BUGT, SUMMER 1964,
by G. Potocsky, and F. Kniskern. Mar 66, 48p
Informal manuscript-0-53-65

Descriptors: (*Ice, Arctic regions), Climatology, Meteorology, Navigation charts, Naval vessels (Support), Shipping (Marine), Arctic Ocean.

Identifiers: Melville Bugt, Baffin Bay, Labrador Sea.

Anomalous (severe) ice conditions occurred during summer 1964 in Melville Bugt. Factors producing the variation are analyzed in order to determine whether the anomaly should have been predicted. Based on historical conditions, however, the ice prediction had been made as accurately as possible. The variation was attributed to severe weather conditons. (Author)

AD-634 664 **Field 8L**
CFSTI Prices: HC$1.00 MF$0.50
Cold Regions Research and Engineering Lab., Hanover, N. H.
MASSIVE UNDERGROUND ICE IN NORTHERN REGIONS,
by Jerry Brown. Jun 66, 14p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Ice, Undergound), Wedges, Permafrost, Northern Hemisphere.

The discussions of massive underground ice are restricted to ice wedges and particularly to their formation, distribution, constitutional properties, and possible uses.

8M. SOIL MECHANICS

AD-402 329 **Field 8M**
CFSTI Price: HC$7.60
Army Tank Automotive Center, Warren, Mich. Land Locomotion Lab.
EFFECTS OF DISTURBANCE TO CLAY SOILS AS MEASURED BY EMPIRICAL SOIL STRESS-STRAIN PARAMETERS,
by Louis J. Goodman. Jun 62, 78p LL-76, 7782
Projs. 5510.11.822, DA-570-05-001

Descriptors: (*Soil mechanics, Trafficability), Vehicles, Shear stresses, Deformation, Clay, Tanks (Combat vehicles).

A summary of results of an investigation to evaluate the effects of the disturbance of stress-strain relations of clay soils is presented. Experimental equipment and procedures used to obtain load sinkage and horizontal shear soil values are described. Data are presented and discussed including an evaluation of vertical load and horizontal shear values proposed for use in soil-vehicle relationships. Horizontal shear observations and a comparison of sinkage from a rigid wheel in undisturbed and completely disturbed cohesive soil are presented. Some preliminary observations concerning the determination of different degrees of disturbance of clay soils and the influence of the size effect of soil loading devices on soil value measurements are presented. Data show reduction in the spread of cohesive and frictional moduli of soil deformation as a result of disturbance and a decrease of strength. A subsequent increase in strength is noted that is dependent on time after disturbance. (Author)

AD-402 334 **Field 8M**
CFSTI Price: HC$4.60
Army Tank Automotive Center, Warren, Mich. Land Locomotion Lab.
ON THE STATISTICAL PROPERTIES OF THE GROUND CONTOUR AND ITS RELATIONS TO THE STUDY OF LAND LOCOMOTION,
by J. L. Bogdanoff, and F. Kozin. Mar 62, 42p
Rept. no. 7823, LL-78
Projs. 5510.11.822, DA-570-05-001

Descriptors: (*Statistical analysis, Soil mechanics), (*Soil mechanics, Statistical analysis), Trafficability, Roads, Vehicles, Terrain.

In this report statistical models of the ground surface contour are considered along with possible forms for the two dimensional power spectral density. The advantages and disadvantages of the models are pointed out. Perturbations in the power spectral density of the surface are studied to determine the magnitude of their effect on an optimum criterion chosen for vehicle parameter studies. Finally, the power spectral densities from an actual ground surface survey are presented and discussed.

AD-402 391 **Field 8M, 13F**
CFSTI Price: HC$5.60
Army Tank Automotive Center, Warren, Mich. Land Locomotion Lab.
ON THE STATISTICAL ANALYSIS OF LINEAR VEHICLE DYNAMICS,

by J. L. Bogdanoff, and F. Kozin. Mar 62, 59p
Rept. no. 7824, LL-73
Projs. 5510.11.822, DA-570-05-001

Descriptors: (*Statistical analysis, Soil mechanics), (*Vehicles, Dynamics), Linear systems, Trafficability, Model theory.

Statistical analyses of the dynamics of some two-dimensional linear vehicles traveling on a rough track are performed to determine the influence on two aspects of vehicle ride of a set of parameters which include wheel base length, idealized tire imprint length, speed, and damping constant. It is assumed that the vehicles move with constant horizontal velocity on a second order, weakly stationary and mean square continuous random track with contact maintained at all times between the idealized tires and the track. The two aspects of vehicle ride used as measures of the ride roughness are peak value of power spectral density and variance of frame acceleration, the frame acceleration being either vertical at the c. g. of frame, vertical at the point over idealized wheel, or angular (pitching). For the same speed, damping, power spectral density for the track, and two particular vehicles, the idealized tire imprint length was a relatively unimportant parameter over a fairly large range of values. On the other hand, one parameter which included the wheel base length was found to be important under the same conditions. Four sets of parameter values were found which at the same speed produced best or optimal rides for vertical acceleration at the frame c. g. and over the wheel, depending upon which measure of ride roughness was employed. The influence of speed was then examined on vehicles having these sets of parameter values. In all cases, increasing speeds produced sharp increases in ride roughness. (Author)

AD-450 631 **Field 8M, 11A**
CFSTI Price: HC$5.60
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
DUSTPROOFING AND WATERPROOFING OF SOILS. LABORATORY STUDIES OF SOIL WATERPROOFING MATERIALS.
Jul 63, 55p Rept. no. 2, TR-3-530

Descriptors: (*Moistureproofing, Soils), (*Soils, Moistureproofing), (*Soil mechanics, Additives), (*Additives, Soil mechanics), Asphalt, Silicone plastics, Furaldehydes, Salts, Protective treatments.

In the extended investigation of selected materials, both an unmodified and a chemically modified kerosene-cutback asphalt (MC-O), a silicone salt, aniline-furfural, a fatty quaternary salt, and a commercial road oil were employed as treatments for five soil types. The water-resistance characteristics compacted treated specimens were examined by means of a capillary-rise wetting test conducted through four cycles of alternate drying and wetting. Of the additives studied, aniline-furfural was sufficiently effective and versatile as a waterproofer of all the soils to be considered the most promising system for military purposes examined to date. The remaining materials tested varied in effectiveness over the range of soils used, and are considered to be less satisfactory than the aniline-furfural for military application. On the basis of these results, it is recommended that field evaluation studies of the aniline-furfural system be conducted under conditions of exposure to weathering and traffic operations to establish its utility as a soil waterproofing and dustproofing treatment for military purposes. (Author)

AD-470 096 **Field 8M, 13B**
CFSTI Prices: HC$7.60 MF$0.75
Naval Civil Engineering Lab., Port Hueneme, Calif.
FAILURE MODES OF SAND SURROUNDING A LATERALLY DISPLACED PILE SUBJECTED TO STATIC AND IMPACT LOADS,
by L. W. Heller. Jul 65, 73p Technical note N-737
Proj. Y-R011-01-01-068

Descriptors: (*Sand, Foundations (Structures)), (*Foundations (Structures), Sand), (*Soil mechanics, Loading (Mechanics)), Impact shock, Statics, Failure (Mechanics).

An experimental investigation has been conducted to define the patterns of soil movement in the vicinity of a laterally displaced pile under static and impact loadings. A 2-inch-square, 30-inch-long stiff model pile section was embedded 18 inches into a box of uniform dry sand which had a colored grid pattern. The pile was loaded laterally; the sand was wetted, allowed to drain, and was vertically sectioned to photographically record the characteristic patterns of sand movement. The data reveal that the horizontal sand movement about the lower portions of the embedded pile are similar for both static and impact loadings, but that impact loadings produce larger sand movements near the surface. Influence values and volume factors for the sand motion in the vicinity of the pile are given for both static and impact loads. Inertial pile loading, developed as a consequence of the soil movement, can be determined from these quantities. (Author)

AD-634 622 **Field 8M, 13F**
CFSTI Prices: HC$1.00 MF$0.50
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Mobility and Environmental Div.
DEVELOPMENT OF A FORMULA FOR TOWING RESISTANCE FOR A WHEEL IN SOFT SOIL,
by John L. McRae. Jun 66, 13p
Proj. RD-1-L-0-13001-A-91A
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Soil mechanics, Trafficability), Vehicle wheels, Towed vehicles, Mobility, Soils, Compressive properties, Mathematical analysis.

Identifiers: Buckingham pi theorem.

The Buckingham pi theorem approach to dimensional analysis is used. Analyses are made for a rigid wheel and pneumatic-tired wheels.

AD-634 678 **Field 8M, 20K**
CFSTI Prices: HC$1.00 MF$0.50
Ohio River Div. Labs., Cincinnati.
ULTRA HIGH VACUUM ADHESION AND FRICTION,
by E. Stanley Gall, and John H. Hubbard. Jun 66, 11p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Vacuum, *Friction), (*Powders, *Adhesion), (*Soils, Adhesion), Molecular association, Powders, Chemical bonds, Electrostatics, Films.

The problem of determining the magnitude and nature of the forces between grains in a powder was approached by measuring the force between a simple pair of surfaces of known gross contour. This was done in order to minimize the number of parameters which would have to be taken into account in the interpretation of the test results. The test results were evaluated in terms of the characteristics exhibited by the forces involved. The characteristics of particular interest are magnitude, range and dependence on surface cleanliness. These characteristics are used to evaluate which of the various mechanisms which have been proposed to account for adhesion forces is most likely to be dominant. (Author)

BNWL-243 **See Field 8G**

8N. TERRESTRIAL MAGNETISM

AD-443 875 **Field 8N, 4A**
CFSTI Price: HC$24.90
Electrical Engineering Research Lab., Univ. of Texas, Austin.
A STUDY OF THE TRANSMISSION OF PLANE HYDROMAGNETIC WAVES THROUGH THE UPPER ATMOSPHERE,
by C. E. Prince Jr, F. X. Bostick Jr, and H. W. Smith. 15 Jul 64, 253p Rept. no. 134
Contract Nonr-375 (14)
Proj. NR-371-032

Descriptors: (*Upper atmosphere, Terrestrial magnetism), Electromagnetic waves, Radiofrequency power, Exosphere, Wave transmission, Propagation, Integral transforms, Ionosphere, Numerical analysis, Magnetohydrodynamics, Magnetic fields, Electric fields, Matrix algebra, Tables, Programming (Computers), Atmosphere models, Particles, Motion, Boundary value problems, Reviews, Series, Special functions, Polynomials, Vector analysis.

A new conductivity dyadic was used to study the propagation of ordinary and extraordinary modes of wave propagation in a partially-ionized gas. The conductivity tensor included effects of all collisions and the motion of neutral particles. Medium parameters were those of the earth's upper atmosphere. The range of frequencies considered was that of geomagnetic micro-pulsations, 0.001-10.0 cps. Geomagnetic equatorial regions received special attention. Incoming incident waves were assumed on a plane-stratified ionosphere. Resultant steady-state frequency responses, impulse responses, current density, electric field, and power dissipation profiles, and power spectra for daytime and nighttime atmospheres were computed. A study of coupling between the two characteristic modes showed appreciable collisional coupling in the lowest ionosphere. (Author)

AD-634 262 **See Field 4A**

9A. COMPONENTS

AD-289 893 **Field 9A**
CFSTI Price: HC$2.60
General Electric Co., Schenectady, N. Y. Superpower Microwave Tube Lab.
SUPERPOWER MILLIMETER WAVE TUBE.
Quarterly progress rept. no. 4, 1 Mar-31 May 62, by H. L. Thal. 31 May 62, 23p
Contract DA-36-039-sc-88960
Proj. DA-3A-99-13-021
See also AD-289 898.

Descriptors: (*Traveling-wave tubes, Millimeter waves), (*Microwave amplifiers, Design), X band, Extremely high frequency, Waveguide couplers, Cavity resonators, Anodes (Electron tubes), Cathodes (Electron tubes), Waveguide windows, Standing wave ratios, Radiofrequency power, Circuits.

Identifiers: Orthotrons.

The new X-band Orthotron was designed in detail. The anode has twelve uniform cavities and has an active length of 5.6 inches or four wavelengths. Identical input and output couplers are used at opposite ends of the anode. The input signal excites the pi mode on the anode structure. The wave is amplified as it travels along the tube and is then coupled to the output waveguide. The dimensions of the couplers and the design of the selective mode absorbers have been determined by cold testing. The tube consists of eight main subassemblies which will be welded together. All parts were fabricated, and the subassemblies are being

brazed. The long anode vane structure was electrical-discharge machined from a solid copper cylinder. The axial magnetic field required for operation will be provided by a three-section solenoid. This magnetic circuit and the waveguide circuitry necessary for testing were obtained and calibrated. (Author)

AD-289 894 **Field 9A**
CFSTI Price: HC$2.60
General Electric Co., Schenectady, N. Y. Superpower Microwave Tube Lab.
SUPERPOWER MILLIMETER WAVE TUBE.
Quarterly progress rept. no. 2, 1 Sep-30 Nov 61, 30 Nov 61, 24p
Contract DA-36-039-sc-88960
Proj. DA-3A-99-13-021
See also AD-289 899

Descriptors: (*Traveling-wave tubes, Millimeter waves), (*Microwave amplifiers, Design), X band, Anodes (Electron tubes), Cavity resonators, Standing wave ratios, Waveguide irises, Waveguide couplers, Impedance matching, Radiofrequency power, Extremely high frequency.

Identifiers: Orthotrons.

The design of the X-band Orthotron was completed. The success of the input coupler, tuned choke-output iris coupler and unwanted mode absorber was demonstrated and all cold-test data presented. (Author)

AD-289 897 **Field 9A**
CFSTI Price: HC$4.60
General Electric Co., Schenectady, N. Y. Superpower Microwave Tube Lab.
SUPERPOWER MILLIMETER WAVE TUBE.
Final rept. no. 5, 22 May 61-15 Jul 62. 15 Jul 62, 46p
Contract DA-36-039-sc-88960
Proj. DA-3A-99-13-021

Descriptors: (*Traveling-wave tubes, Millimeter waves), (*Microwave amplifiers, Design), X band, Klystrons, Extremely high frequency, Frequency shift, Impedance matching, Anodes (Electron tubes), Electron beams, Cathodes (Electron tubes), Transmission lines, Radiofrequency power.

Identifiers: Orthotrons.

Some fundamental concepts of Orthotron operation are presented. By utilizing general power and energy relations, the performance of an Orthotron is related to a magnetron oscillator with the same cross section. The first case studied was an axially-uniform structure, and the rate of growth of Orthotron power is shown to be inversely proportional to the product of the group velocity of the Orthotron structure and the Q (minimum) of the magnetron. In the second case, the structure consists of axially-short sections coupled together to form a periodic network. The operation in this case is basically the same as in the first except that the gain (per unit length) - bandwidth product may be increased by decreasing the length of the individual sections. The reverse component of power is assumed to be negligible in the first two cases. The problem including the reverse power is formulated, and the mechanism of reverse power is formulated, and the mechanism of reverse power cancellation is considered for two special cases. (Author)

AD-289 898 **Field 9A**
CFSTI Price: HC$2.60
General Electric Co., Schenectady, N. Y. Superpower Microwave Tube Lab.
SUPERPOWER MILLIMETER WAVE TUBE.
Quarterly progress rept. no. 3, 1 Dec 61-28 Feb 62. 28 Feb 62, 25p
Contract DA-36-039-sc-88960
Proj. DA-3A-99-13-021
See also AD-289 894.

Descriptors: (*Traveling-wave tubes, Millimeter waves), (*Microwave amplifiers, Design), X band, Extremely high frequency, Anodes (Electron tubes), Cavity resonators, Impedance matching, Waveguide couplers, Waveguide windows, Transmission lines, Radiofrequency power, Cathodes (Electron tubes).

Identifiers: Orthotrons.

A new x-band Orthotron was designed after careful consideration of the fundamentals involved in the loading of spurious modes. The anode structure has twelve uniform cavities and is four free space wavelengths long. It does not employ any physical tapering and may readily be scaled to millimeter wavelengths. Identical input and output couplers are used. The energy from all twelve anode cavities is combined internally and coupled out through a 1-1/2 in. diameter, high power window. Cold testing of the couplers is underway. Electrodes for electrical discharge machining of the anode structure from a copper cylinder were fabricated. (Author)

AD-289 899 **Field 9A**
CFSTI Price: HC$2.60
General Electric Co., Schenectady, N. Y. Superpower Microwave Tube Lab.
SUPERPOWER MILLIMETER WAVE TUBE.
Quarterly progress rept. no. 1, 22 May-1 Sep 61. 1 Sep 61, 29p
Contract DA-36-039-sc-88960
Proj. DA-3A-99-13-021

Descriptors: (*Traveling-wave tubes, Millimeter waves), (*Microwave amplifiers, Design), X band, Phase shifters, Extremely high frequency, Anodes (Electron tubes), Waveguide couplers, Waveguide irises, Space charges, Impedance matching, Standing wave ratios, Tuning devices, Radiofrequency power.

Identifiers: Orthotrons.

Presented is the design of the X-band Orthotron and the construction and cold-testing of component parts. It is shown that careful attention to output coupling and unwanted mode loading is absolutely necessary to control and stabilize the device so that the desired Orthotron amplification process can take place. The unwanted modes are identified and steps to eliminate oscillation in these modes are presented and discussed. Drawings of the input coupler, output coupler and mode loading circuits are presented and discussed. Results of anode cold tests and input coupler cold tests are presented and discussed. (Author)

AD-294 301 **Field 9A**
CFSTI Price: HC$9.60
General Electric Co., Syracuse, N. Y. Electronics Lab.
FIELD EFFECT TRIODES AND SPACE CHARGE LIMITED TRIODES.
Quarterly rept. no. 1, 1 Jun-31 Aug 62, by J. M. Blank, W. T. Tantraporn, K. K. W. Reinhartz, and W. L. Willis. 31 Aug 62, 91p
Contract DA-36-039-sc-90756
Proj. DA-3A99-21-001

Descriptors: (*Triodes, Production), (*Transistors, Production), Space charges, Dielectrics, Cadmium compounds, Sulfides, Electrodes, Hall effect, Semiconductor devices.

A discussion of thin-film, field-effect triode operation is presented, in which charge redistribution, additional injection of carriers, and trap emptying are considered as possible mechanisms. Several techniques for triode fabrication are described: ruling with a diamond point; masking with fine wires; masking by two photo-resist methods; and using a micropositioner for precise location of evaporated gate electrodes. Difficulties with the adhesion of Si0 to CdS are pointed out. Electrical measurements for the field effect triode aare also discussed. Some of the consequences of the present theories for space charge limited triodes are presented. There are concerned with the allowable density of electron trapsas a function of trap depth. Also, some comparisons are made between observed current densities and predicted values. A novel moving-screen technique for depositing metal and insulation layers for fine grid lines is described. Alternative materials of construction are desired characteristics for these materials are discussed. The physical chemistry of the system, cadmium sulfide-cadmium-sulfur, is discussed and calculations of equilibrium values of vapr pressure vs. temperature are given. (Author)

AD-404 819 **Field 9A, 20L**
CFSTI Price: HC$13.60
Lincoln Lab., Mass. Inst. of Tech., Lexington.
SOME RESULTS FOR HIGHER-ORDER VARACTOR FREQUENCY MULTIPLIERS,
by Bliss L. Diamond. 21 Mar 63, 136p Rept. no. 47G-5
Contract AF 19 (628)-500, ARPA Order-56

Descriptors: (*Varactor diodes, Frequency multipliers), (*Frequency multipliers, Varactor diodes), Semiconductor devices, Reliability (Electronics), Harmonic analysis, Series, Fourier analysis, Resistance (Electrical), Electric currents, Statistical data, Electrical properties, Radiofrequency power, Numerical analysis, Voltage.

Analyses and numerical results for several frequency multipliers utilizing lossy abrupt-junction varactors are presented. The theory is based on a series model of the varactor -- a constant resistance in series with a nonlinear elastance. This model proves to be a good characterization of practical varactors and permits us to perform closed-form solutions for multipliers of any order. The problem is a nonlinear one and, consequently, it is not possible to make one solution which is applicable to all multipliers; rather, we have to solve each multiplier separately by lengthy literative numerical calculations. Therefore, only a limited number of the infinity of possibilities are treated. (Author)

AD-409 102 **Field 9A**
CFSTI Price: HC$7.60
General Electric Co., Syracuse, N. Y. Electronics Lab.
FIELD EFFECT TRIODES AND SPACE CHARGE LIMITED TRIODES.
Quarterly rept. no. 3, 1 Dec 62-28 Feb 63, by J. M. Blank, W. Tantraporn, K. K. Reinhartz, W. L. Willis, and A. E. Cahill. 28 Feb 63, 79p
Contract DA-36-039-sc-90756
Proj. DA-3A99-21-003

Descriptors: (*Transistors, Semiconductor films), (*Semiconductor films, Manufacturing methods), Zinc alloys, Oxides, Cadmium alloys, Sulfides, Vacuum apparatus, Vapor plating, Sandwich construction, Metal films, Aging (Materials), Solid state physics, Resistance (Electrical), Hall effect, Photoconductivity, Space charges, Molecular beams.

Field effect triodes. A detailed conduction mechanism for thin-film field effect triodes is presented. New experimental findings seem to substantiate the trap-emptying mechanism. The results of varying SiO and CdS thickness in field-effect triodes and their effect on device performance are shown. Effects of device aging and electrode configurations on device performance are also discussed. Space charge limited triodes. The requirements for producing space charge limited current in devices are discussed, and possible methods of fulfilling them are presented. Cadmium sulfide improvement. A post-deposition treatment of cadmium sulfide films is outlined and results are presented. Zinc oxide material improvement. The difficulties in evaporation of zinc oxide are discussed and the results of these experiments are presented. (Author)

AD-411 558 **Field 9A, 13H**
CFSTI Price: HC$61.50
Western Electric Co., Laureldale, Pa.
PRODUCTION ENGINEERING MEASURE: MECHANIZATION FOR .4 WATT DIODES AND 2N560 2N1051 2N1072 2N1195 TRANSISTORS, PHASE I.
Final engineering rept. for 26 Jun 59-31 Dec 62, by M. N. Reppert. 31 Dec 62, 619p
Contract DA-36-039-sc-81294

Descriptors: (*Transistors, Manufacturing methods), (*Diodes (Semiconductor), Manufacturing methods), (*Industrial production, Semiconductor devices), Automation, Cleaning, Bonding, Degasification, Welding, Paint applicators, Test equipment (Electronics), Test sets, Chemical milling, Aging (Materials), Silicon, Germanium, Glass, Gold, Electrical properties, Machines, Coatings.

Efforts were directed towards increased production capability to ensure that 2N560, 2N1051, 2N1072 and 2N1195 transistors and ten types of .4 watt diodes can be produced in sufficient quantity for the Nike-Zeus Missile Defense Network. As integrated transistor production line provides the high-volume production capability needed for 2N560, 2N1051 and 2N1195 transistors, TO-5 devices. Seventeen machines were developed to produce these devices under this contract. Nine machines have been assigned to 2N559 and 2N1094 production since integrating the mechanized transistor production lines. Certain machines were modified so TO-5 devices as well as the TO-18 devices of that Contract can be processed. Production of 2N1072 transistors was augmented during this Production Engineering Measure by mechanizing two bottleneck operations of the manual production line. The high-volume production capability for the .4 watt diodes was established by providing 10 prototype machines and 2 commercial machines. High-volume production tooling was developed for one commercial machine. (Author)

AD-416 686 **Field 9A**
CFSTI Price: HC$3.60
RCA Labs., Princeton, N. J.
RESEARCH STUDY FOR INCREASING THE SENSITIVITY OF PHOTOEMITTERS.
Quarterly technical rept. no. 6, 1 Apr-30 Jun 63, by R. E. Simon, A. H. Sommer, E. K. Gatchell, W. H. McCarroll, and C. R. Fuselier. 16 Jul 63, 34p
Contract DA-44-009-eng-4913

Descriptors: (*Photocathodes, Preparation), (*Photoelectric effect, Sensitivity), Molecular beams, Deposition, Cesium alloys, Potassium alloys, Antimony alloys, X-ray diffraction analysis, Chemical analysis, Electron diffraction analysis, Single crystals, Semiconductor devices, Germanium, Diffusion, Epitaxial growth.

Progress is reported in the development of apparatus for simultaneous and quasi-simultaneous deposition of the constituents of S-20 photocathodes by the molecular beam technique. Several modifications of standard S-20 cathodes were attempted. A conducting substrate for the Cs-K-Sb photocathode was developed. X-ray diffraction and chemical analysis experiments were conducted to establish the chemical composition of Cs-K-Sb cathodes. Development of the techniques for high energy electron diffraction of photocathodes and low energy electron diffraction of single crystals was continued. Small area shallow p-n junctions were prepared in germanium by diffusion and epitaxial growth for field induced photoemission with low reverse bias currents. (Author)

AD-430 212 **Field 9A**
CFSTI Price: HC$3.60
RCA Labs., Princeton, N. J.
RESEARCH STUDY FOR INCREASING THE SENSITIVITY OF PHOTOEMITTERS.
Quarterly technical rept. no. 8, 1 Oct-31 Dec 63, by R. E. Simon, A. H. Sommer, W. H. McCaroll, and C. R. Fuselier. 16 Jan 64, 38p
Contract DA-44-009-eng-4913
See also AD-430 919.

Descriptors: (*Photocathodes, Preparation), (*Photoelectric effect, Sensitivity), Sodium alloys, Potassium alloys, Antimony alloys, Solid solutions, Molecular beams, Deposition, Electron diffraction analysis, Semiconductor devices, Cathodes (Electron tubes).

Experiments demonstrated that it is possible to replace sodium in Na3Sb by K to produce Na2KSb without further deposition of Sb. This avoids the step of yoyoing with K and Sb in the formation of an S-20 cathode. Attempts to make multi-alkali cathodes with Rb were not successful. Replacement of antimony by other metals in the cesium processing of multi-alkali photocathodes had no beneficial effect. Molecular beam production of photocathodes by quasi-simultaneous deposition was limited by inaccuracy in beam calibration. Application of electron diffraction to cathodes formed by the molecular beam method showed that diffraction studies can yield information on multi-phase systems. Greatly improved p-n junctions with sharp reverse characteristics were produced for use as field induced photoemitters. (Author)

AD-430 919 **Field 9A**
CFSTI Price: HC$3.60
RCA Labs., Princeton, N. J.
RESEARCH STUDY FOR INCREASING THE SENSITIVITY OF PHOTOEMITTERS.
Quarterly technical rept. no. 7, 1 Jul-30 Sep 63, by R. E. Simon, A. H. Sommer, and W. H. McCarroll. 21 Oct 63, 39p
Contract DA-44-009-eng-4913
See also AD-416 686.

Descriptors: (*Photocathodes, Preparation), (*Photoelectric effect, Sensitivity), Antimony, Molecular beams, Deposition, Films, Photosensitivity, Cathodes (Electron tube), Chemical analysis, Cesium alloys, Potassium alloys, Antimony alloys, X-ray diffraction analysis, Electron diffraction analysis, Sodium alloys, Solid solutions.

A molecular beam antimony source was developed. The first attempts were made to form multi-alkali cathodes by quasi-simultaneous deposition of alkali metals on a rotating substrate, but definative results have not yet been obtained. Processing experiments on S-20 cathodes showed that a higher ratio of red to blue response can be obtained by using thicker cathode films. The response beyond 8000 A was found to vary greatly from tube to tube. So far, it has not been possible to identify the parameter which determines the long wavelength threshold. Chemical and X-ray analyses demonstrated that composition of the K-Cs-Sb cathode is K2CsSb and that it is a unique point in the cubic solid solution extending from Cs3Sb to K2.08Cs0.92Sb. The high energy electron diffraction apparatus was used successfully to follow the formation of a multi-alkali cathode by conventional processing from the initial deposit of antimony to the final composition of Na2KSb. (Author)

AD-435 788 **Field 9A**
CFSTI Price: HC$6.60
Honeywell Research Center, Hopkins, Minn.
THIN FILM IMAGE CONVERTER.
Interim technical progress rept. no. 3, 24 Oct 63-23 Jan 64,
by Paul W. Kruse, Fred C. Pribble, Richard G. Schulze, and Valdis Sneberg. 20 Feb 64, 68p
Contract DA-44-009-AMC-168 (T)
Proj. 8F23-11-001-07
See also AD-430 501.

Descriptors: (*Semiconductor devices, Image intensifiers (Electronics)), (*Image intensifiers (Electronics), Films), Semiconducting films, Gallium alloys, Arsenic alloys, Gallium compounds, Phosphides, Germanium, Photoelectric cells (Semiconductor), Diodes (Semiconductor), Electroluminescence, Epitaxial growth, Vapor plating.

Identifiers: Gallium arsenide, Gallium phosphide.

The performance of an elemental thin film image converter was simulated by a model consisting of a pnp Ge phototransistor in electrical series with a GaAs electroluminescent diode. Under the most favorable operating conditions, the radiant emittance of the diode is two orders of magnitude less than the irradiance of the phototransistor. The reasons for the attenuation, and potential improvements, are discussed. A literature survey of the optical properties of GaP is presented. The close-spaced vapor transport method for preparing epitaxial layers of GaAs on Ge is described. (Author)

AD-439 853 **Field 9A**
CFSTI Price: HC$4.60
RCA Labs., Princeton, N. J.
RESEARCH STUDY FOR INCREASING THE SENSITIVITY OF PHOTOEMITTERS.
Quarterly technical rept. no. 9, 1 Jan-31 Mar 64, by R. E. SimonA. H. Sommer, and W. H. McCarroll. 15 Apr 64, 42p
Contract DA-44-009-eng-4913
See also AD-430 212.

Descriptors: (*Photocathodes, Preparation), (*Photoelectric effect, Sensitivity), Cathodes (Electron tubes), Sodium alloys, Potassium alloys, Antimony alloys, Cesium, Electron diffraction analysis, Deposition, Molecular beams, Vapor plating, Crystal oscillators, Semiconductor devices, Germanium.

Attempts to produce S-20 photocathodes by a one-step process have so far only been successful in leading to a one-step process for S-24 (Na2KSb) cathodes. Preliminary results from life tests on cathodes exposed to tube parts which have not been cesiated indicate that under these conditions, life is limited. Electron diffraction studies of photocathodes deposited on room temperature substrates by sequential deposition from molecular beams indicate that a good multi-alkali crystalline deposit does not result and probably explains why good photocathodes are not produced by this method. Promising results are reported of experiments where simultaneous deposition of the cathode constituents by the molecular beam method is made. Preliminary results of experiments on photocathodes using a quartz crystal oscillator as a mass detector and on cathode formation by flash evaporation are reported. An attempt to observe field induced photoemission from germanium p-n junctions was not successful. (Author)

AD-440 424 **Field 9A**
CFSTI Price: HC$11.60
Watkins-Johnson Co., Palo Alto, Calif.
DEVELOPMENT OF A MILLIMETER LOW-NOISE TRAVELING-WAVE AMPLIFIER.
Final rept. no. 8, 1 Dec 60-31 Dec 63, by E. W. Kinaman. 31 Dec 63, 118p
Contract DA-36-039-sc-87384, ARPA Order-141-60
Task 5976-01-004-10-06

Descriptors: (*Microwave amplifiers, Traveling wave tubes), (*Traveling wave tubes, Millimeter waves), Extremely high frequency, Electron guns, Noise (Radio), Impedance matching, Cathodes (Electron tubes), Molybdenum, Design, Gain, Cryogenics, Focusing.

This final report summarizes the development work under the contract and the results obtained. Techniques were developed and applied culminating in several practical wideband amplifiers. The highest overall gain noted was 45 db at band center (93.75 Gc) with best noise figure at 16 db. Operation from 68 to over 100 Gc was demonstrated

but the practical instantaneous bandwidth was limited to 15 or 20 Gc in each case due to dispersion. Continuance toward a field-type model is strongly recommended on the basis of the demonstrated feasibility and present radiometric need. Extension of this development of the 1-2 mm region is now entirely practical. In addition, cryogenic operation can remove the criticalness from the focusing components and conceivably result in a 6 db noise figure device with 45 Gc bandwidth centered at the 3.2 mm atmospheric window. (Author)

AD-442 635 **Field 9A, 20L**
CFSTI Price: HC$4.60
Radio Corp. of America, Princeton, N. J. Defense Electronic Products.
FIELD EFFECT AND SPACE-CHARGE-LIMITED THIN FILM TRIODES.
Quarterly rept. no. 3, 1 Jan-31 Mar 64.
30 Apr 64, 43p
Contract DA-36-039-AMC-02374

Descriptors: (*Semiconductor devices, Semiconducting films), Dielectric films, Stability, Electrical conductance, Transistors, Life expectancy, Encapsulation, Tests, Temperature, Selenium, Coatings, Electrodes, Cadmium compounds, Sulfides, Tellurium, Manufacturing methods, Vapor plating, X-ray diffraction analysis, Surface properties, Triodes.

Shelf and operational life tests continued. Vacuum and selenium encapsulated TFT units now show a stability equivalent to that of germanium transistors. A study has been made of various phases of instability which occur in encapsulated thin-film transistors when bias is applied. It has been found that the channel conductivity decreases for positive gate bias and increases for negative gate bias. A steady-state conductivity is reached after about four hours and remains steady for as long as 1000 hours while bias is applied. After removal of the bias, the conductivity returns to its initial value in about 24 hours. At 70 C the time constants are about half of the values at room temperature. The amount of change varies from unit to unit, being larger (25 per cent average) for low-conductivity units and negligible for high-conductivity units. Related to these instabilities are changes in channel conductivity which occur when units are handled. These are attributed to static discharges through the insulator. A preliminary comparison (one unit operated for 1000 hours) of evaporated selenium coating of the finished TFT and vacuum encapsulation indicates that the former process amy be as good as the latter. (Author)

AD-444 669 **Field 9A**
CFSTI Price: HC$11.60
Westinghouse Electric Corp., Elmira, N. Y. Electronic Tube Div.
SCAN-CONVERSION STORAGE TUBE BASED UPON THE PERMACHON.
Final rept. no. 15, 1 Jan-31 Mar 64.
31 Mar 64, 116p
Contract DA-36-039-AMC-00149 (E)
Task 1G6-22001-A-005-03
Continuation of Contract DA-36-039-sc-85051.

Descriptors: (*Storage tubes, Fiber optics), Reading machines, Scanning, Test equipment (Electronics), Electric currents, Vidicons, Luminescence, Television equipment.

Two types of scan-conversion storage tubes based upon the Permachon camera storage tube were developed, and both tubes utilize a fiber-optics photon transfer (FOPT) target for the signal conversion mechanism. The smaller of the two tubes, the WX 4640, is 16-1/2 in. long, 1-1/2 in. in diameter, and contains an FOPT target with a 3/4-in. diameter useful area. The reading gun in this tube is electromagnetically focused and deflected, while the writing gun is electrostatically focused and electromagnetically deflected. The large scan-converter, the WX 4821, is 31 in. long, 3 in. in diameter, and has an FOPT target with a 2-in. diameter useful area. Both of the electron guns in this tube are electrostatically focused and deflected. This report summarizes all the development work performed on the Permachon scan-converters, including recently obtained data on charge-down subsequent to erasure, aperture-response, and flood-beam holding. Also included as an Appendix are additional data on characteristics measured from the WL 7383 Permachon camera storage tube. (Author)

AD-447 260 **Field 9A, 20L**
CFSTI Price: HC$2.60
hp associates, Palo Alto, Calif.
INVESTIGATION OF HOT ELECTRON EMITTER.
Scientific rept. no. 8, 1 Apr-30 Jun 64,
by M. M. Atalla. 30 Jun 64, 27p
Contract AF 19 (628)-1637
Proj. AF-4608
Task 460804
AFCRL-64-673
See also AD-601 135.

Descriptors: (*Semiconductor devices, Photoelectric effect), (*Transistors, Electrical properties), (*Semiconducting films, Electrical properties), Cadmium compounds, Selenides, Impurities, Indium, Hall effect, Scattering, Grain boundaries, Diodes (Semiconductor), Platinum, Metal films, Gold, Silicon, Absorption spectrum, Resistance (Electrical).

Identifiers: Cadmium selenide.

Analysis of the evaporated CdSe films shows that the indium dopant is present in the films at the same concentration as in the source, but that the In is not electrically active, presumably due to compensation. Hall measurements as a function of temperature show activation energies for conduction electron concentration to be from 0.36 to 0.77 eV. The Hall mobility of these films is about 4 sq. cm2/V-sec at 25C and increases with increasing temperature with a constant activation energy, suggesting that electron scattering is dominated by grain boundaries. CdSe-Pt diodes exhibit linear reverse leakage up to about 2V, and space charge limited current in forward bias. Fabrication of hot electron triodes with CdSe is being discontinued. The studies of the attenuation of hot electrons in gold have been completed. Additional data on optical absorption of very thin gold films on Si substrates show that the initially published value of Lp ± 740A is in error, due to the use of absorption data for Au on glass substrates. That data when corrected with our absorption data for Au on Si give a value of Lp ± 350A. The resistivity of our thin gold films has also been measured, and these data indicate that the value of Lp ± 350A is close to that of perfect gold. (Author)

AD-447 262 **Field 9A**
CFSTI Price: HC$5.60
Stanford Univ., Calif. Stanford Electronics Labs.
A TRANSISTOR AMPLIFIER WITH 500-Mc BANDWIDTH.
Technical rept.,
by David W. Howell. Jun 64, 73p SU-SEL-64-054, TR-1820-1
Contract AF 04 (695)-353

Descriptors: (*Transistor amplifiers, Power amplifiers), Bandwidth, Band-pass amplifiers, Performance (Engineering), Pulse amplifiers, Intermediate frequency amplifiers, Feedback amplifiers, Mechanical drawings, Video amplifiers, Design, Gain.

The design, construction, and evaluation of a low-pass transistor amplifier having 50-db insertion power gain and 500-Mc bandwidth are discussed. The amplifier, useful for i-f, rf, or fast-pulse amplification, consists of seven common-emitter stages, each having collector-to-base feedback. A generalized design procedure is given which should be useful for the construction of other lowpass amplifiers having bandwidths of 500 Mc or greater. (Author)

AD-451 775 **Field 9A**
CFSTI Price: HC$8.60
Radio Corp. of America, Camden, N. J. Defense Electronic Products.
FIELD EFFECT AND SPACE-CHARGE-LIMITED THIN FILM TRIODES.
Final rept. no. 4, 1 Jul 63-30 Jun 64,
by J. J. Bowe, W. H. Laznovsky, F. V. Shallcross, P. K. Weimer, and L. P. Wennik. 31 Jul 64, 94p
Contract DA-36-039-AMC-02374

Descriptors: (*Semiconductor devices, Semiconducting films), Vapor plating, Manufacturing methods, Stability, Electrical conductance, Transistors, Life expectancy, Encapsulation, Tests, Temperature, Electrodes, Coatings, Cadmium compounds, Sulfides, Tellurium, Surface properties, Space charges.

During this program, materials and techniques were studied to improve the reproducibility and stability of CdS TFTs, and to obtain an understanding of the failure mechanisms. Early in the program the average life of TFTs (as measured, for example, by the half-life of the value of g sub m) was on the order of days. At the conclusion of the program life has been extended to over a year. The fall-off in g sub m for CdS TFTs is now comparable to the degradation rate of germanium transistors which have not been aged. Success with vacuum-encapsulated hermetically scaled units shows the significance of adverse ambients, particularly oxygen. Vitreous selenium encapsulation is equally effective, judging from early results of testing. Crowding of characteristics is associated with oxidation of contact interfaces. A second type of instability-a short time variation-was studied; this is associated with trapped charge and charge migration under field. Control of this calls for control of charge included in the evaporated film. Results of the program show that a stable TFT may be achieved by proper fabrication and sealing. Indications are that a postfabrication aging process would yield extremely stable devices. (Author)

AD-472 738 **Field 9A, 9C**
CFSTI Prices: HC$1.00 MF$0.75
Battelle Memorial Inst., Columbus, Ohio.
PREINDICATIONS OF FAILURE IN ELECTRONIC COMPONENTS,
by J. W. Klapheke, B. C. Spradlin, and J. L. Easterday. 31 Jul 65, 61p
Contract DA-01-021-AMC-11706 (Z)
RSIC-445
Supported in part by Aeronautics and Space Admin. Geo. C. Marshall Space Flight Center, Huntsville, Ala.

Descriptors: (*Failure (Electronics), Checkout equipment), (*Electronic equipment, Failure (Electronics)), Malfunctions, Transistors, Avalanche diodes, Tunnel diodes, Resistors, Capacitors, Coils, Electron tubes, Test equipment (Electronics).

This report discusses state-of-the-art information and techniques concerned with indications of potential degradation and catastrophic failure in electronic components. The objective of this survey is to present a comprehensive description of past, present, and future planned work on preindicators of failure for certain electronic components. This study is intended to provide basic information for future development in automatic checkout equipment. The following electronic parts were covered in the survey: semiconductors (transistors, diodes, and microcircuits), resistors, capacitors, inductors, computer cores, other items used in a computer, and vacuum tubes. Such items as wire, insulation, lamps, relays, and rotary devices were not considered. Precursors of failure have been investigated for electronic components but few have been identified at the present time. Most of these investigations were undertaken as part of programs directed at physics of failure, screening, or accelerated testing. The results of this study show that predictors of failure for semiconductors (transistors, diodes, and microcircuits) have received more attention than other types of parts. Current noise (1/f noise) and infrared emission

profiles show promise as precursors that would apply to all types of semiconductors. Apparently computer cores and inductors are the least considered. (Author)

AD-478 107 Field 9A
CFSTI Prices: HC$6.00 MF$1.50
New York Univ., N. Y. Electron Devices Group.
PROCEEDINGS OF THE HIGH-POWER MICROWAVE TUBES SYMPOSIUM HELD AT THE HEXAGON, FORT MONMOUTH, NEW JERSEY 19 AND 20 MAY 1965, VOLUME I.
20 May 65, 300p
Contract DA-28-043-AMC-00039 (E)

Descriptors: (*Microwave amplifiers, Symposia), (*Electron tubes, Symposia), Antenna arrays, C band, Crossed field devices, Duplexers (Electronics), Beams (Electromagnetic), Cathodes (Electron tubes), Transients, Traveling-wave tubes M, Modulators, Klystrons, L band, Microwave equipment.

Crossed-Field Amplifiers for Phased Arrays; A High Gain, C-Band, Cross-Field Amplifier; High Power Plasma Duplexer Study; Gas Clean-Up in High-Power Duplexers; An Approach to Predicting the Reliability of High-Power Microwave Tubes; A Large Signal Analysis for 'O' Type Microwave Amplifiers; Operating Measurements of High Power Noise Generator Tubes; The High-Power Capabilities of Beam Plasma Amplification; Progress in High Emission Density Cathodes; Transients in High-Power Modulators; CW, Coupled-Cavity, Traveling-Wave Tubes-State-Of-The-Art; The VA-143A Twystron Hybrid TWT; Superpower Capability with Wide Bandwidth - A Demonstration of Traveling-Wave Multiple-Beam Klystron; Extended-Interaction Circuits for High-Power Klystrons; Spurious Oscillations in High-Perveance, High-Voltage Klystrons; Recent Developments in Multi-Megawatt Broadband Klystrons; Design and Development of Companion 30 MW/30 KW UHF/L Band Klystrons; Development of a One-Megawatt CW Klystron. (Author)

AD-634 129 Field 9A, 9C, 20C, 201 K
CFSTI Prices: HC$5.00 MF$1.00
Cornell Univ., Ithaca, N. Y. School of Electrical Engineering.
INVESTIGATIONS OF LINEAR BEAM AND NEW CONCEPTS OF MICROWAVE POWER GENERATION.
Final rept. 1 Oct 63-30 Sep 65.
May 66, 175p
Contract AF 30 (602)-3243
Proj. AF-5573
Task 557303
RADC-TR-66-62-Vol-1
See also AD-616 001

Descriptors: (*Electron beams, *Microwave oscillators), (*Klystrons, Phase shifters), (*RADIOFREQUENCY GENERATORS, Electron beams), Circuits, Electromagnetism, Plasma physics, Lasers, Solid state physics, Electron tubes.

This report includes studies on (1) the interaction of magnetically focused electron beams with electromagnetic circuits, (2) basic electromagnetic interaction circuits, (3) electron beam phenomena, (4) an electron-beam plasma amplifier, (5) laser-stimulated emission, and (6) bulk microwave solid-state electronic devices. (Author)

AD-634 130 Field 9A, 9C, 20C, 201 K
CFSTI Prices: HC$6.00 MF$1.50
Cornell Univ., Ithaca, N. Y. School of Electrical Engineering.
INVESTIGATIONS OF LINEAR BEAM AND NEW CONCEPTS OF MICROWAVE POWER GENERATION.
Final rept. 1 Oct 63-30 Sep 65.
May 66, 277p
Contract AF 30 (602)-3243
Proj. AF-5573
Task 557303
RADC-TR-66-62-Vol-2
See also AD-634 129

Descriptors: (*Electron beams, *Microwave oscillators), (*Klystrons, Phase shifters), (*Radiofrequency generators, Electron beams), Circuits, Electromagnetism, Plasma physics, Lasers, Solid state physics, Electron tubes.

This report includes studies on (1) the interaction of magnetically focused electron beams with electromagnetic circuits, (2) basic electromagnetic interaction circuits, (3) electron beam phenomena, (4) an electron-beam plasma amplifier, (5) laser-stimulated emission, and (6) bulk microwave solid-state electronic devices. (Author)

AD-634 151 Field 9A, 13H
CFSTI Prices: HC$7.00 MF$1.50
Tung-Sol Electric, Inc., Livingston, N. J. Power Tube Div.
PRODUCTION ENGINEERING MEASURE FOR TYPE 7890 SUPER POWER HYDROGEN THYRATRON.
Final rept., 7 Mar 62-15 Apr 65,
by C. L. Shackelford, 15 Apr 65, 325p
Contract DA-36-039-sc-85984
See also AD-613 678.

Descriptors: (*Thyratrons, Manufacturing methods), Hydrogen, Electron tube parts, Performance (Engineering), Radiofrequency power, Specifications, Quality control, Design, Life expectancy.

The tube design, tooling, and assembly methods followed produce a tube meeting the requirements of SCL-7001/59 dated 3 October 1960 and the added requirement that the cathode heater current be limited to 30 amperes, maximum. The principal mechanical problem encountered was the cracking of the metal in anode cups made according to the original design. The means used to by-pass the problem are not an ultimate solution. Grid emission tends to become the limiting factor in the operation of the tube. The emission was suppressed principally by providing means of cooling the grid. The reservoir and the cathode are adequate for present requirements. The tube would be improved by increasing the capacities of both reservoir and cathode. At rated operating conditions, the present limit on the tube's life is in cathode performance. The area of the emitter could be increased conveniently by 15 percent and still be effectively heated within the cathode heater current limitations of SCL-7001/59, dated 3 October 1960. Heating time would be relatively unaffected. The reservoir capacity could be doubled at no increase in heating power but only an increase in heating time.

AD-634 214 Field 9A, 13H
CFSTI Prices: HC$1.00 MF$0.50
Midland-Wright, Kansas City, Kans.
PRODUCTION ENGINEERING MEASURE RELIABLE QUARTZ CRYSTAL MICROELEMENTS TYPES EL-MCRO1 (X-1) AND EL-MCRO2 (X-1).
Quarterly progress rept. no. 4, 1 Oct-31 Dec 65,
by Stuart Radetsky, 31 Dec 65, 25p
Contract DA-36-039-AMC-03639E

Descriptors: (*Microminiaturization (Electronics), *Quartz), High frequency, Very high frequency, Reliability (Electronics), Performance (Engineering), Crystal holders, Vapor plating, Manufacturing methods.

Plate design improvement has been made for the MCRO1 - 7.000 MC and MCRO2 - 20.000 MC units. MCRO1 - 20.000 MC, MCRO2 - 45.000 MC and MCRO2 - 70.000 MC units passed all of the requirements measured in the first group of engineering samples. Development of a new material and a new application method for crystal tabbing has been initiated. A modified PERT Plan for progrm progress evaluation has been submitted and approved. (Author)

AD-634 369 Field 9A, 9D
CFSTI Prices: HC$1.00 MF$0.50
Tufts Univ., Medford, Mass. Dept. of Mechanical Engineering.
A STUDY OF ACOUSTICAL MULTIPATH SYSTEMS. SECTION II. SUBJECTIVE TESTING.
Final rept.,
by H. Geoffrey Fisher, 1 Jun 66, 16p
Contract Nonr-494 (00)

Descriptors: (*Speech, *Signal-to-noise ratio), (*Earphones, Tests), (*Vocabulary, Intelligibility), Sound, Word association, Acoustic equipment, Training, Multipath transmission, Noise, Phonetics.

An attempt was made at examining the effect of various Signal-to-Noise Ratios (S/N) on speech.

AD-634 386 Field 9A, 13H
CFSTI Prices: HC$2.00 MF$0.50
General Electric Co., Auburn, N. Y. Semiconductor Products Dept.
A PRODUCT ENGINEERING MEASURE FOR THE IMPROVEMENT OF PRODUCTION TECHNIQUES TO INCREASE THE RELIABILITY AND TO IMPROVE PRODUCT CAPABILITY OF HIGH VOLTAGE MINIATURE SILICON RECTIFIERS.
Quarterly progress rept. no. 5, 30 Dec 65-30 Mar 66,
by W. R. Comstock, P. C. Whitman, R. R. Schall, and E. G. Tefft, 30 Mar 66, 35p
Contract DA-36-039-AMC-06157 (E)
See also AD-626 419.

Descriptors: (*Rectifiers, Manufacturing methods), (*Silicon, Rectifiers), (*Diodes (Semiconductor), Silicon), Reliability (Electronics), Life expectancy, Specifications, Miniature electronic equipment.

The work performed includes: A14 Life Test Matrix, Presentation of 500-hour life test summaries, and Final device specification.

AD-634 393 Field 9A
CFSTI Prices: HC$3.00 MF$0.75
General Electric Co., Auburn, N. Y. Semiconductor Products Dept.
RESEARCH AND DEVELOPMENT OF SILICON CONTROLLED RECTIFIERS FOR HIGH FREQUENCY AMPLIFIER APPLICATIONS.
Final rept., 16 Oct 64-16 Jun 66.
Jun 64, 100p
Contract NObsr-91299
Proj. SR-0080304
Task 9348
See also AD-628 214

Descriptors: (*Silicon controlled rectifiers, High frequency), Amplifiers, Manufacturing methods, Performance (Engineering), Electric currents.

This final report describes the research and development conducted to obtain a high-current, high-frequency silicon controlled rectifier. The development proce s including design, optimization, fabrication and characterization is described and discussed in detail. (Author)

AD-634 447 Field 9A, 13H
CFSTI Prices: HC$1.00 MF$0.50
Army Electronics Command, Fort Monmouth, N. J. Electronic Components Lab.
QUARTZ CRYSTAL UNITS FOR VERY HIGH FREQUENCIES.
Technical rept.,
by Eduard A. Gerber, Apr 66, 21p
Proj. DA-1P6-22001-A-058
Task 1P6-22001-A-058-01
ECOM-2697

Descriptors: (*Quartz resonators, Very high frequency), (*Quartz, Precision finishing),

Etching, Gold, Plating, Resistance (Electrical), Crystal holders, High frequency, Performance (Engineering).

A method is briefly described for lapping and polishing round quartz crystals in the frequency range 20-180 Mc. The performance of crystals, made by this method, surpasses that of any other known crystals in this range. The average series resistance is 14 ohms at 75 Mc for the third, 40 ohms at 125 Mc for the fifth, and 55 ohms at 175 Mc for the seventh harmonic mode. Methods are described, the application of which will reduce unwanted modes and diminish the influence of the vibrational amplitude upon crystal parameters. (Author)

AD-634 475 **Field 9A, 13J**
CFSTI Prices: HC$7.60 MF$0.75
General Dynamics Corp., Groton, Conn. Electric Boat Div.
AN/MS ELECTRICAL CONNECTORS MIL-C-5015 FOR USE INBOARD ON SUBMARINES.
Design study rept.,
by Henry L. Sanford Jr. and Richard G. Barrows. Jul 62, 71p Rept. no. U413-62-030
Contract NObs-86068

Descriptors: (*Electric connectors, Submarines), Military requirements, Design, Specifications, Standards.

MS Connectors (Mil-C-5015) are presently used inboard on submarines in conjunction with standard Navy jacketed cable (Mil-C-915). Problems were encountered in wiring the plugs to the cables, as the plugs were originally designed for the aircraft industry and used with bundled insulated conductors. This study outlines the problems and offers data relating to connectors and cables presently used inboard on the SSB (N)608 FBM submarines. The inadequacy of the existing MS plugs (Mil-C-5015) for use with Navy cable is outlined. The recent addition of plug endbells, to allow more space for wiring, is discussed as is the even more recent use of crimp removable contacts to eliminate solder pot junctions. MS connectors with crimp removable contacts, as promoted by three connector manufacturers, are evaluated with respect to design and interchangeability. Finally, recommendations are offered which will allow the reliable use of the MS connectors with Navy cable inboard on submarines which meets the shipbuilding specifications. (Author)

AD-634 505 **Field 9A, 20G**
CFSTI Prices: HC$3.00 MF$0.75
Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
NANOSECOND SWITCHING OF AN ELECTRON BEAM.
Master's thesis,
by Raymond V. Sutton. Mar 66, 59p GSP/PH/66-18

Descriptors: (*Electron beams, *Electronic switches), Design, Transmission lines.

Identifiers: Theses, Nanosecond pulses.

A triple grid electron beam switch was designed to provide long current pulses with fast risetimes and minimum energy dispersion of the current. Theory was developed for a general, idealized switch in which the center conductor of a transmission line became the center grid of the triple grid switch. Thus the voltage on this grid, and the field that switched the electrons, could be that of a nanosecond pulse generator, with no distortion caused by lumped (discrete) electrodes. The theory indicated that transit time effects still limit the operation of the switch, making the requirements for fast risetimes and low energy dispersions incompatible, but that present equipment was capable of nanosecond risetimes with 10% energy dispersions. A switch was built to the theoretical design, and tested on 20-50 volt, 10 to the -8 to 10 to the -5 ampere electron beams. The output current risetime was at most 6 ns, the risetime of the detector used. Theory also indicated a second mode of operation which might be useful. In this mode the electron beam is used at a distance from the switch, so that the energy dispersion of the beam has time to improve the risetime of the current. There was some indication in the evaluation that this effect occurs. (Author)

AD-634 536 **Field 9A, 9B**
CFSTI Prices: HC$1.00 MF$0.50
Lincoln Lab., Mass. Inst. of Tech., Lexington.
R AND D PROGRAM TO DESIGN AND FABRICATE DIGITAL MONOLITHIC MICROCIRCUITS HAVING AVERAGE PROPAGATION DELAY TIME OF 1 NS.
Progress rept. no. 6, 1 Oct-31 Dec 65.
31 Dec 65, 15p
Contracts AF 19(628)-500, AF 19(628)-5167
ESD-TR-66-209
Under Subcontract 295, Prepared in cooperation with Philco Corp., Lansdale, Pa., rept. no. X-507 (Ext. of R-181). See also AD-633 615.

Descriptors: (*Circuits, *Microminiaturization (Electronics)), Digital systems, Computer logic, Transistors, Packaged circuits, Circuit interconnections, Silicon, Integrated circuits, Gates (Circuits).

Investigations were conducted toward the primary objective of fabricating silicon monolithic microcircuits with average propagation delay times in the subnanosecond region. Preliminary investigations were also made of the speed improvements obtainable by fabricating and interconnecting arrays of high performance microcircuits within a single silicon chip. High speed gates and high speed, high density arrays were the two areas stressed in the development of microcircuits centered about the high performance transistor. Improved transistors, microcircuits and a ring oscillator were fabricated and samples delivered for evaluation. (Author)

AD-634 539 **Field 9A, 20L, 9B**
CFSTI Prices: HC$3.00 MF$0.75
LFE Electronics, Boston, Mass. Research Div.
RESEARCH IN FERROMAGNETICS WITH APPLICATIONS TO NEW STORAGE DEVICES.
Annual rept. no. 5, 1 Sep-31 Aug 64.
by Harrison W. Fuller, R. Hornreich, R. J. Spain, and H. I. Jauvtis. 31 Aug 64, 74p Rept. no. 570-A5
Contract Nonr-2676 (00)
Proj. NR-048-173
See also AD-607 270.

Descriptors: (*Ferromagnetic materials, Films), (*Thin films (Storage devices), Ferromagnetic materials), Magnetic properties, Analysis of variance, Boundary value problems, Taper, Configuration, Optical analysis.

The magnetization distribution is calculated for Neel wall finite in thickness but infinite in the other two dimensions. The variational technique yields a solution in terms of elliptic functions that is different from, but a good approximation of, other models based on finite film thickness. The charge density is calculated as a beginning toward accurately determining the interaction field of two Neel walls each of which is one of a pair of close-spaced films. The results of a study of edge effects in tapered edge films are reported and the methods used to produce these films are described. Experimental evidence is presented which verifies the presence of the theoretically predicted magnetization 'curling' configuration. The 'tapered edge curling' theory is further supported by the absense of the higher energy 'closure domain' configuration. Studies of domain wall properties and interaction in double-layer films is reported. An apparent preference for the formation of Neel type walls has been observed in the double layer films. Experimental evidence is given and energy calculations are presented for configurations of Bloch wall and Neel wall interactions with a neighboring film. The lowering of wall energies and a transition to wall structures of the Neel type are verified in terms of the magnetostatic interaction between a wall in one film and the magnetic material of a superimposed layer.

AD-634 640 **Field 9A**
CFSTI Prices: HC$1.00 MF$0.50
Army Electronics Command, Fort Monmouth, N. J.
TRANSMISSION MODE UHF MAGNETO-ACOUSTIC DELAY LINE,
by William Skudera, Robert Sproat, Isidore Bady, and Emanuel Gikow. Jun 66, 14p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Delay lines, Ultrahigh frequency), Wave transmission, Magnetism, Acoustics, Yttrium, Iron Garnet, Single crystals.

Identifiers: YIG material, Magnetoacoustics.

The paper reports the investigation of a magnetoacoustic delay line, in which both spin waves and acoustic waves are used to accomplish the delay. The material used was a single crystal rod of yttrium iron garnet, with the rod serving both as the transducer and delay medium. CONCLUSIONS: Data has been presented on both a slow and fast variation of insertion loss covering the frequency range of 200 to 1,000 mc. The fast variation is due to interference effects between the main pulse and a secondary pulse which is generated by reflection due to 'mismatch' at the turning point. The fast variation has been shown to occur only over a portion of the pulse and may be absent if the pulse is sufficiently short. The use of auxiliary magnets which generate a non-uniform field perpendicular to the main field along the rod axis reduces insertion loss, reduces or eliminates the fast variation, and thus reduces distortion in long pulses. Also the bonding together of two YIG rods for obtaining longer delays was shown to be feasible at these frequencies. (Author)

AD-634 744 **Field 9A, 9E**
CFSTI Prices: HC$3.00 MF$0.50
Radio Corp. of America, Somerville, N. J. Electronic Components and Devices.
STRUCTURES FOR 300-WATT, 400MHZ UHF POWER TRANSMISSION.
Interim technical rept. no. 2, 1 Jan-31 Mar 66,
by F. Katnack, R. Minton, D. Jacobson, and R. Rosenzweig. Jan 66, 55p
Contract AF 33(615)-3202
See also AD-628 712.

Descriptors: (*Transistors, Radiofrequency power), Capacitance, Failure (Electronics), Capacitors, Power amplifiers, Circuits, Very high frequency, Ultrahigh frequency, Films, Integrated circuits.

Capacitance measurements are presented for integral versus wire-bonded leads. The measurements indicate a 20 percent reduction in C sub ob because of the elimination of the bonding areas. A package design is presented which allows the assembly of integral lead devices in a modified TO-60 case. Electrical measurements are given for devices which have buried diffused N + conductance plugs. The results show the expected decrease in capacitance but also show a loss in rf power output. This loss has been attributed to a residual high-resistivity region under the periphery of the emitter. Wafers have also been processed by a modified refill-method to form N+plugs. This technique utilizes a refill with high-resistivity silicon in areas surrounding each emitter site, and has the advantage of allowing emitter diffusion to be performed in the original bulk silicon. Three types of failures, produced under dc and rf test conditions, were observed on the TA2657 transistor. Illustrations and visual characteristics of each type of failure are given. Design considerations of thin-film inductors as well as measurements on

two experimental coil designs are presented. MOS capacitors were constructed and values are given for capacitance versus voltage and oxide thickness. The theory of operation for and the circuitry of a distributed line amplifier are discussed. Power outputs of 36 watts at 400 MHz have been achieved by four 2N3632 transistors in this circuit. Operation of a single package Darlington-connected power transistor circuit has been shown feasible at high frequencies. (Author)

AD-634 762 **Field 9A, 13H**
CFSTI Prices: HC$1.00 MF$0.50
Army Electronics Command, Fort Monmouth, N. J.
CHROMIUM MASKS FOR MICROCIRCUITRY.
Technical rept.,
by Alex Rogel. May 66, 20p ECOM-2715
Proj. DA-1P622001A056
Task 02

Descriptors: (*Integrated circuits, Photoengraving), (*Films, Chromium), Etching, Processing, Electron beams, Vapor plating, Glass, Silicon.

A method for preparing durable chromium films which may be used as masks in making photoresist patterns for microcircuitry has been developed. Films deposited by this method were found to have excellent adhesion to glass and silicon and produced good uniform and reproducible patterns. A technique for etching chromium films was developed using a photoresist process and an acid and metal etchant. (Author)

AD-634 763 **Field 9A, 11C**
CFSTI Prices: HC$1.00 MF$0.50
Army Electronics Command, Fort Monmouth, N. J.
AN ADVANCEMENT IN TRANSISTOR SECOND BREAKDOWN PERFORMANCE USING MOLYBDENUM METALIZATION.
Technical rept.,
by Edward B. Hakim. May 66, 16p ECOM-2716
Proj. 1P6-22001-A-056
Task 01

Descriptors: (*Transistors, Performance (Engineering)), Failure (Electronics), Molybdenum, Metal coatings, Silicon, Electric terminals, Transients, Leakage (Electrical), Phase studies, Aluminum.

Transistors which have become inoperative due to collector-emitter short circuits have usually been driven into second breakdown. Second breakdown itself, however, is not the destructive mechanism. Alloying of the contact metalization into the device produces the short circuit which is observed. This report describes the experimental results of transistors having molybdenum-aluminum metalization compared to devices with only aluminum contacts. The results indicated that devices with molybdenum, when driven into second breakdown, would outlive aluminum units with respect to current by a factor of three. (Author)

IDO-17103 **Field 9A, 18H**
CFSTI Prices: HC$3.00 MF$0.75
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
TRANSIENT NUCLEAR RADIATION EFFECTS ON TRANSDUCER DEVICES AND ELECTRICAL CABLES.
by F. D. Terry, R. L. Kindred, and S. D. Anderson. Nov 65, 76p
Contract AT (10-1)-205

Descriptors: (*Electric cables, Radiation damage), (*Transducers, Radiation damage).

For abstract, see T 66 15.

AD-420 687 **See Field 9B**

AD-458 541 **See Field 20L**

AD-464 777 **See Field 20L**

AD-470 066 **See Field 13H**

AD-634 246 **See Field 20E**

AD-634 247 **See Field 20E**

AD-634 248 **See Field 20E**

AD-634 249 **See Field 17A**

AD-634 354 **See Field 13H**

AD-634 426 **See Field 20L**

AD-634 493 **See Field 18H**

AD-634 524 **See Field 11B**

AD-634 689 **See Field 9E**

AD-634 719 **See Field 11D**

AD-634 761 **See Field 9C**

UCRL-14602 **See Field 18D**

9B. COMPUTERS

AD-420 687 **Field 9B, 9A**
CFSTI Price: HC$3.60
Lincoln Lab., Mass. Inst. of Tech., Lexington.
A MULTI-CAVITY KLYSTRON COMPUTER PROGRAM INCLUDING POTENTIAL DEPRESSION CORRECTION,
by S. F. Catalano, C. Guay, G. L. Guernsey, R. L. Pease, and M. E. Schwarz Jr. 29 Aug 63, 35p
Rept. no. 43G-1
Contract AF 19 (628)-500, ARPA Order-85
N64-17664

Descriptors: (*Programming (Computers), Klystrons), (*Klystrons, Programming (Computers)), Programming languages.

The report describes a computer program which may be used to investigate the characteristics of a multicavity klystron. It is written for the IBM 7090 in 'Fortran' language so that it may be intelligible to people other than the originator of the program. It is written for solid or hollow beam klystrons. For maximum flexibility it is in the form of several subroutines connected by a master control program. It is complete in the sense that it leaves nothing for the user to compute manually. (Author)

AD-457 197 **Field 9B**
CFSTI Price: HC$2.60
Michigan Univ., Ann Arbor. Inst. of Science and Technology.
A SIMPLE DEVICE FOR AIDING THE PROGRAMMING OF THE LGP-30 DIGITAL COMPUTER,
by Willim D. Becher. Feb 65, 19p Rept. no. 6400-15R
Contract DA-28-043-AMC-00013 (E)
Proj. Michigan

Descriptors: (*Compilers, Programming (Computers)), (*Programming (Computers), Compilers), (*Digital computers, Programming (Computers)), Data processing systems, Programming languages.

Identifiers: Michigan project, LGP-30 digital computer.

A simple device for aiding machine language programming of the General Precision LGP-30 digital computer is described. This aid (similar to a circular sliderule) facilitates program time optimization, bit weighting and binary point location, and binary-hexadecimal-decimal conversion. In addition, frequently needed tables are printed on the aid. Full-scale reproductions of the aid scales are included to permit easy construction. (Author)

AD-462 158 **Field 9B**
CFSTI Price: HC$2.60
Thomas J. Watson Research Center, Yorktown Heights, N. Y.
TIME-SHARING ON A MULTICONSOLE COMPUTER,
by Arthur L. Samuel. Mar 65, 27p
Contract Nonr-4102 (01)
Rept. on proj. MAC, rept. no. MAC-TR-17

Descriptors: (*Computers, Multiple operation), (*Scheduling, Computers), Real time, Information retrieval.

Identifiers: MAC project, Time sharing (Computers).

After a brief historical review and a description of the three basic types of time-sharing systems, the general purpose time-sharing system as exemplified by the M.I.T. CTSS system is described in general terms, with particular attention to the way the system looks to the user. (Author)

AD-634 251 **Field 9B, 5H**
CFSTI Prices: HC$1.00 MF$0.50
Lincoln Lab., Mass. Inst. of Tech., Lexington.
GRAPHICS.
Semiannual technical summary rept., 1 Dec 65-31 May 66,
by Jack I. Raffel. 31 May 66, 13p
Contract AF 19 (628)-5167, ARPA Order-691
ESD-TR-66-212

Descriptors: (*Graphics, *Compilers), Man-machine systems, Digital-to-analog converters, Display systems.

Identifiers: TX computers.

Efforts in the Graphics Program have continued to concentrate on the development of the Graphical Service System and VITAL, a compiler-compiler. The latter program is now operational. Development of a debugging system which utilizes graphics as a central communications medium has been initiated. In an effort to improve the methods of generating points, lines, and general conic sections in display systems, a simple waveform generator has been designed, based on homogeneous coordinate mathematics. The hardware problems in the implementation of this design are being investigated. A three-dimensional ultra-sonic position-sensing device has been installed in TX-2 and initial evaluation is under way. (Author)

AD-634 304 **Field 9B, 17B, 9D, 5H K**
CFSTI Prices: HC$1.00 MF$0.50
Research Lab of Electronics, Mass. Inst. of Tech., Cambridge.
WORD-RECOGNITION COMPUTER PROGRAM.
Technical rept.,
by Bernard Gold. 15 Jun 66, 27p TR-452
Contract DA-36-039-AMC-03200 (E), Grant NSF-GK-835
Proj. DA-200-14501-B31F
Supported in part by NIH grant no. 5 P01-MH-04737-06 and NASA grant NsG-496.

Descriptors: (*Voice communication systems, *Man-machine systems), (*Speech recognition, *Programming (Computers)), Decision making, Learning machines, Sound signals, Actuators, Acoustics, Digital computers.

Identifiers: Word-recognition.

A word-recognition computer program has been designed and tested for a vocabulary of 54 words and a population of 10 male speakers. The program performs the functions of segmentation, measurements on the segments, and decision making. Out of the 540 words, 74 were incorrectly classified by the program. (Author)

AD-634 325 **Field 9B, 5A, 12B**
CFSTI Prices: HC$3.00 MF$0.75
Carnegie Inst. of Tech., Pittsburgh, Pa. Graduate School of Industrial Administration.
AN EVALUATION OF COMMERCIAL TIME SHARING SYSTEMS.
Management sciences research rept.,
by M. M. Gold, and A. C. Stedry. 1966, 60p
MSRR-71
Contract Nonr-760 (24)
Proj. NR-047-048
Also under Contract Nonr-4102 (01) Proj. MAC at M.I.T.

Descriptors: (*Computers, *Operations research), (*Management engineering, Computers), Data processing systems, Commerce.

Identifiers: Time sharing (Computers), Multiple access system.

The design of computers and systems which afford simultaneous multiple-user access has been a subject of industrial and academic research for several years. Installation of several 'time-shared' computer systems has proceeded with additional research and development devoted to their improvement. The major effort evidenced, however, has been directed to the development of these facilities as systems with only secondary attention paid to the requirements of the potential users and almost none to management users -- the subject of interest here. In this paper we will attempt to evaluate certain aspects of time-shared systems using the requirements of the potential managerial user as units of analysis. Possible applications of time-sharing are discussed. Description of usage in extant systems is included where applicable but the far-more-vast potential uses constitute the prime focus. In addition, two commercial time-sharing services available to many companies are described in detail as possible predecessors of envisioned gigantic centralized computer systems whose economies of scale and elimination of redundant data storage make their use by even the largest of companies advantageous. (Author)

AD-634 371 **Field 9B, 5B, 5A**
CFSTI Prices: HC$2.00 MF$0.50
Mitre Corp., Bedford, Mass.
AESOP: A GENERAL PURPOSE APPROACH TO REAL-TIME, DIRECT ACCESS MANAGEMENT INFORMATION SYSTEMS,
by J. Spiegel, J. K. Summers, and E. M. Bennett.
Jun 66, 38p MTP-33
Contract AF 19 (628)-5165
Proj. AF-5050
ESD-TR-66-289
See also AD-632 320

Descriptors: (*Information retrieval, *Management planning), (*Data processing systems, Information retrieval), Television display systems, Command + Control systems, Light communication systems, Cathode ray tubes, Computers, Real time, Programming (Computers), Military requirements.

Identifiers: AESOP, On-line systems, List processing, Light pens, Computer consoles.

AESOP, a laboratory-based prototype of a general purpose, on-line, visually-oriented information system, is used to investigate ways of handling many different types and levels of command and management problems spanning organizational levels from the executive suite down through the staff and operations analysts to the actual system designers and programmers. In particular, it deals with those organizational activities that require highly flexible, direct-access capabilities. The system is configured for easy use by the inexperienced as well as by the sophisticated, and utilizes a variety of user station devices to facilitate such flexibility, including a cathode-ray-tube display, a lightgun, a typewriter, and associated push-buttons. At each station, it is capable of generating, editing, and formatting information on-line, as well as building, executing, and debugging on-line the analytic and mathematical procedures and algorithms of both the users and the system itself, depending upon the organizational area or level of the user. Although the basic prototype system was developed for use in military command and management planning and information systems, its philosophy and concepts are applicable to industrial and academic organizations. (Author)

AD-634 526 **Field 9B, 9D, 5B**
CFSTI Prices: HC$3.00 MF$0.75
Office of Naval Research, Washington, D. C.
INFORMATION SYSTEMS SUMMARIES,
by Richard H. Wilcox. Jul 65, 76p ONR-ACR-113

Descriptors: (*Information theory, Reviews), (*Data processing systems, Reviews), Documentation, Computers, Computer logic, Automata, Linguistics, Pattern recognition, Machines, Electronics.

Contents: General information sciences; Machine interaction with humans; Improved machines.

AD-634 593 **Field 9B, 5I**
CFSTI Prices: HC$1.00 MF$0.50
Illinois Univ., Urbana. Coordinated Science Lab.
A DESCRIPTIVE LIST OF PLATO PROGRAMS,
by Elisabeth R. Lyman. Jun 66, 9p R-296
Contracts DA-28-043-AMC-00073 (E), Nonr-3985 (08)
Proj. DA-20014501B31F
Supported in part by the Office of Education Contract OE-6-10-184.

Descriptors: (*Teaching machines, *Programmed instruction), Programming (Computers), Computer logic, Teaching methods, Digital computers, Learning.

Identifiers: PLATO teaching system.

The report lists with brief descriptions the teaching lesson sequences which have been using tutorial logics, inquiry logics, or combinations thereof. The version of the PLATO system for which the lessons were written is specified in each instance. PLATO I and PLATO II lessons are no longer operable because the PLATO I and PLATO II systems are now obsolete, but several of these lessons have been rewritten for the present version of the software and hardware, PLATO III. (Author)

ANL-6987 **Field 9B, 12A**
CFSTI Prices: HC$3.00 MF$0.75
Argonne National Lab., Ill.
RSSR ROUTINE, A ROOT-SQUARING AND SUBRESULTANT PROCEDURE FOR FINDING ZEROS OF REAL POLYNOMIALS,
by Erwin H. Bareiss, and Ronald Hamelink. Oct 65, 73p
Contract W-31-109-eng-38
Prepared in cooperation with Michigan State Univ., East Lansing.

Descriptors: (*Compilers, Numerical analysis), (*Polynomials, Numerical analysis).

Identifiers: RSSR routine.

For abstract, see N 20 13.

BNWL-234 **Field 9B, 20H, 18I**
CFSTI Prices: HC$4.00 MF$0.75
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
FCC-A FUNDAMENTAL MODE CODE FOR FAST REACTOR ANALYSIS,
by W. W. Little Jr, and R. W. Hardie. Mar 66, 126p
Contract AT (45-1)-1830

Descriptors: (*East reactors, Reactor operation), (*Programming (Computers), Reactor operation).

For abstract, see N 20 13.

IS-1225 **Field 9B**
CFSTI Prices: HC$3.00 MF$0.75
Ames Lab., Iowa State Univ. of Science and Tech.
DIAN - A SYSTEM FOR PROGRAMMING A DIGITAL COMPUTER IN TERMS OF ANALOG COMPONENTS,
by G. J. Farris, and L. E. Burkhart. Jan 66, 84p
Contract W-7405-eng-82

Descriptors: (*Digital computers, Programming (Computers)), (*Programming (Computers), Analog computers).

LA-3407 **Field 9B, 12A, 20D**
CFSTI Prices: HC$2.00 MF$0.50
Los Alamos Scientific Lab., Univ. of California, N. Mex.
A STUDY OF TRUNCATION ERRORS IN EULERIAN HYDRODYNAMICS,
by H. J. Longley. Sep 65, 28p
Contract W-7405-eng-36

Descriptors: (*Compressible flow, Data processing systems), (*Shock waves, Compressible flow).

LA-3427 **Field 9B, 18I**
CFSTI Prices: HC$3.00 MF$0.75
Los Alamos Scientific Lab., Univ. of California, N. Mex.
DPC A TWO-DIMENSIONAL DATA PREPARATION CODE,
by W. H. Hannum, and B. M. Carmichael. 28 Jun 65, 64p
Contract W-7405-eng-36

Descriptors: (*Programming (Computers), Nuclear engineering), (*Nuclear engineering, Data processing systems).

LA-3455 **Field 9B, 20D**
CFSTI Prices: HC$2.00 MF$0.50
Los Alamos Scientific Lab., Univ. of California, N. Mex.
REZONE-A PROPOSAL FOR ACCOMPLISHING REZONING IN TWO-DIMENSIONAL LAGRANGIAN HYDRODYNAMICS PROBLEMS,
by Philip L. Browne. 21 Sep 65, 20p
Contract W-7405-eng-36

Descriptors: (*Two-dimensional flow, Programming (Computers)), (*Data storage systems, Hydrodynamics).

MLM-1263 **Field 9B, 18D, 20H**
CFSTI Prices: HC$2.00 MF$0.50
Mound Lab., Miamisburg, Ohio.
DETERMINATION OF COINCIDENCE CORRECTIONS IN A PROPORTIONAL COUNTER. II. I. LEAST SQUARES ANALYSIS BY THE VARIATIONAL AND GENERAL METHODS.
by H. W. Kirby, and J. Z. Braun. 15 Sep 65, 31p
Contract AT (33-1)-GEN-53

Descriptors: (*Coincidence counting, Corrections), (*Proportional counters, Least squares method).

N66-14581 **Field 9B**
CFSTI Prices: HC$3.00 MF$0.75
General Dynamics/Convair, Huntsville, Ala.
SIMULATION OF SELECTED DISCRETE NETWORKS. VOLUME TWO. USER REFERENCE GUIDE DISCRETE NETWORK SIMULATION PROGRAMS.
Final rept.
Sep 65, 77p GD/C-DDF-65-005-Vol-2
Contract NAS8-20016
NASA-CR-69010

Descriptors: *Manual, *Computer program, *Network, *Simulation.

ORNL-TM-1172 **Field 9B**
CFSTI Prices: HC$1.00 MF$0.50
Oak Ridge National Lab., Tenn.

MAGNETIC FIELD STORAGE CODES AND ORBIT CALCULATIONS,
by Mozelle Rankin. 18 Jun 65, 8p
Contract W-7405-eng-26

Descriptors: (*Programming (Computers), Data storage systems), (*Magnetic fields, Computer storage devices).

PB-169 352 **Field 9B, 12B**
CFSTI Prices: HC$2.60 MF$0.50
Commissariat a l'Energie, Atomique Saclay (France). Centre d'Etudes Nucleaires.
JANVIER: PROGRAMME DE RESOLUTION SUR IBM 7094 DES PROBLEMES DE CELLULES EN GEOMETRIE PLANE, SPHERIQUE ET CYLINDRIQUE DANS L'APPROXIMATION DOUBLE Pn. (JANUARY: IBM 709 4Programme for the Resolution of Cell Problems in Planar, Spherical and Cylindrical Geometry Using the Double Pn Approximation),
by Albert Amouyal, and Henri Tariel. Feb 66, 23p
CEA-R-2896
Text in French; Attached Summary in English.

Descriptors: (*Programming (Computers), Mathematical programming), (*Programming languages, Integrators (Computers)), France, Electrical networks, Geometry, Transformations (Mathematics), Input-output devices.

PB-169 451 **Field 9B**
CFSTI Prices: HC$2.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
SOME APPLICATIONS OF SYNTHESISED NEGATIVE RESISTANCE CHARACTERISTICS TO RING COUNTER DESIGN,
by G. C. Lowe, and D. Thomas. Sep 65, 48p
Technical rept. no. TR-65208

Descriptors: (*Feedback amplifiers, Negative resistance circuits), (*Negative resistance circuits, Simulation), Multiplex, Frequency dividers, Input-output devices, Synchronization (Electronics), Design, Signals, Computers, Waveform generators, Computer logic.

Identifiers: Ring counter.

The large signal bistable properties of negative resistance devices are described and the simulation of negative resistance devices using positive feedback amplifiers is discussed. The form of an ideal characteristic for 'unique bit' ring counter applications is suggested and a practical circuit that fulfills the requirements is proposed. Circuit details of a basic ring counter, a slave ring counter, and a shift register are given and important design criteria are presented. A method of generating interlaced sequential waveforms is described for a system using time division sub-multiplexing of input data. (Author)

PB-169 697 **Field 9B, 5B**
CFSTI Prices: HC$1.60 MF$0.50
Potter Instrument Co., Great Neck, N. Y.
HIGH DENSITY DIGITAL RECORDING SYSTEM,
by J. T. Potter, and P. C. Michel. 17 Mar 66, 13p
NSF Scientific Documentation Project.

Descriptors: (*Data storage systems, Digital recording systems), (*Magnetic recording systems, Digital recording systems), (*Digital recording systems, Magnetic recording systems), Density.

PB-170 497 **Field 9B, 5G, 6D, 5J**
CFSTI Prices: HC$9.60 MF$0.75
Texas Univ., Austin.
TOWARD THE DEVELOPMENT OF A MACHINE WHICH COMPREHENDS,
by Robert K. Lindsay. May 61, 96p
NSF Scientific Documentation Project.

Descriptors: (*Reading machines, Linguistics), (*Artificial intelligence, Reasoning), English language, Syntax, Grammars, Vocabulary, Behavior, Humans, Recall, Memory, Digital computers, Models (Simulations), Semantics, Programming (Computers), Psychology, Information theory.

Identifiers: SAD, SAM.

The fundamental aspects of the reading machine problem are discussed. An attempt is made to define meaning and understanding in useful terms. Means of organizing the storage of information are examined in terms of efficiency and power. A digital computer program is described in detail. This program implements the major features of the reading machine requirements by making some deductions from English text which, though trivial to adult humans, display the kernel of the problem. The findings of experimental psychology in the area of higher mental processes are reviewed. These results are particularly helpful as guides for efficient means of organizing complex systems. Recent results in the study of complex information processes and communication theory are analyzed in terms of the problem under discussion, and some definitions and strategies are offered for carrying out the development of a reading machine. Detailed examinations are given of a computer program which analyzes English syntax and discovers implicit meanings along the lines of the earlier descriptions.

SC-RR-65-502 **Field 9B, 18D**
CFSTI Prices: HC$5.00 MF$1.00
Sandia Corp., Albuquerque, N. Mex.
STATUS REPORT ON MAGNETICS TECHNOLOGY IN ADVANCED DATA SYSTEMS,
by J. B. Saymanski. Nov 65, 186p
Contract AT (29-1)-789

Descriptors: (*Magnetic core storage, Computer logic), (*Data storage systems, Magnetic cores).

UCRL-7644 **Field 9B, 21F, 21H**
CFSTI Prices: HC$4.00 MF$1.00
Lawrence Radiation Lab., Univ. of California, Livermore.
THE FLOSS IV COMPATIBLE PROGRAMS, INCLUDING PROCEDURES FOR THE REAL GAS-DYNAMIC, ONE-DIMENSIONAL PERFORMANCE ANALYSES OF NUCLEAR RAMJET AND ROCKET ENGINES,
by Michael D. Mintz. 28 Sep 65, 127p
Contract W-7405-eng-48

Descriptors: (*Ramjet engines, Programming (Computers)), (*Rocket motors, Programming (Computers)).

Identifiers: Floss IV.

AD-416 573 **See Field 20N**

AD-427 030 **See Field 17I**

AD-465 312 **See Field 1A**

AD-471 647 **See Field 20L**

AD-634 233 **See Field 8K**

AD-634 289 **See Field 6D**

AD-634 310 **See Field 5A**

AD-634 331 **See Field 5A**

AD-634 333 **See Field 5A**

AD-634 483 **See Field 6D**

AD-634 484 **See Field 6D**

AD-634 508 **See Field 5G**

AD-634 514 **See Field 6D**

AD-634 536 **See Field 9A**

AD-634 539 **See Field 9A**

AD-634 541 **See Field 8E**

AD-634 679 **See Field 8E**

ANL-6992 **See Field 7A**

ANL-7113 **See Field 7D**

ANL-7121 **See Field 9C**

BNWL-189 **See Field 18I**

IDO-14650 **See Field 7A**

IDO-17127 **See Field 18I**

LA-3425 **See Field 20D**

LA-3440 **See Field 6B**

NAA-SR-10951 **See Field 18K**

ORNL-3805 **See Field 20H**

ORNL-3824 **See Field 18G**

ORNL-3844 **See Field 20H**

ORNL-3890 **See Field 7A**

ORNL-3919 **See Field 12B**

PB-169 460 **See Field 18K**

PB-169 626 **See Field 5G**

PB-169 696 **See Field 5G**

PB-169 850 **See Field 5A**

PB-169 881 **See Field 18K**

PB-170 419 **See Field 5B**

PB-170 492 **See Field 5B**

PB-170 494 **See Field 6D**

PB-170 495 **See Field 5I**

PB-170 738 **See Field 5B**

TID-4577 **See Field 5B**

UCRL-14431 **See Field 18C**

WCAP-6073 **See Field 18I**

9C. ELECTRIC AND ELECTRONIC ENGINEERING

AD-634 761 **Field 9C, 20C, 9A**
CFSTI Prices: HC$1.00 MF$0.50
Army Electronics Command, Fort Monmouth, N. J.
STUDIES OF VACUUM BREAKDOWN BETWEEN MICRON-SIZED AREAS.
Technical rept.,
by Hans Hieslmair. Apr 66, 19p ECOM-2699
Proj. DA-1P6-22001-A-055
Task 01

Descriptors: (*Electrodes, *Field emission), (*Cathodes (Electron tube), Field emission), Microstructure, Electrical discharges, Vacuum, Scanning, Probes (Electromagnetic), Anodes (Electron tube), Electromagnetic pulses, Tungsten, Copper.

Identifiers: Breakdown (Electrical).

Vacuum breakdown between broad-area electrodes is initiated and occurs in localized areas of the electrodes. A new method of investigating such localized areas with a modified 'Muller' micros-

cope is described and results are discussed. The method consists of scanning a metal surface with a small-area electrode (anode) at constant current and constant voltage. In this manner a plot of the cathode surface is obtained and micron-sized inhomogeneities can be detected. The experimental results indicate that changes of the electrodes occur even at current levels of 10 to the -10th power amperes when the surface is scanned for the first time. Apparent inhomogeneities of the cathode surface can be created or destroyed by current pulses of microamperes. Using the Fowler-Nordheim equation for the analysis of the emission data, it was found that the field enhancement factor is a function of gap spacing, that the field enhancement factor can change slightly at current levels of 10 to the -10th power amperes and can change drastically at current pulses of a few microamperes. The latter current pulses are usually accompanied by pressure increases. (Author)

ANL-7121 **Field 9C, 9B**
CFSTI Prices: HC$1.00 MF$0.50
Argonne National Lab., Ill.
A CATHODE-RAY-TUBE PLOTTING SYSTEM FOR THE CONTROL DATA 3600 COMPUTER,
by G. A. Robinson, and R. F. Krupp. Dec 65, 21p
Contract W-31-109-eng-38

Descriptors: (*Cathode ray tubes, Display systems), (*Programming (Computers), Control systems).

For abstract, see T 66 15.

PB-169 972 **Field 9C**
CFSTI Price: HC$7.60
McCoy Electronics Co., Mount Holly Springs, Pa.
GLASS INCLOSED MINIATURE CRYSTAL UNITS.
Final rept., 1 Aug 58-31 Oct 59.
31 Oct 59, 79p
Contract DA-36-039-sc-74942
Proj. DA-3-24-06-203
AD237 126

Descriptors: (*Miniature electronic equipment, Quartz crystals), (*Crystal oscillators, Crystal holders), Glass seals, Design, Production.

Glass-enclosed quartz crystal units having the same external dimensions as the HC-18/U holder were developed to meet the requirements of Spec-MIL-C-3028B and additional requirements. The frequencies of the units are 17, 20, 25, 30, 35, 40, 45, 50, 55, and 60 mc. Crystals were fabricated in a high percentage of satisfactory yields by the use of a new type of sealing machine; the yields ranged from 65 to 85% during fabrication and sealing. Losses due to temperature cycling from -55 to 105 C were reduced, giving yields up to 84%. The aging losses were about 7% for crystal units stored at 85C for a 94-day period. The technical problems involved in the program and their solutions are discussed. Temperature cycling and aging data are presented for several crystals of each frequency. A detailed description of the fabrication process is appended. (See also AD-220 698).

PB-169 981 **Field 9C**
CFSTI Price: HC$1.60
Midland Mfg. Co., Inc., Kansas City, Kans.
FREQUENCY AND PHASE STABLE CRYSTAL UNIT DEVELOPMENT.
Quarterly rept. no. 3, 1 Sep-1 Dec 59,
by H. E. Dillon. 1 Dec 59, 18p
Contract DA-36-039-sc-78273
Proj. DA-3-26-05-701
AD231 884

Descriptors: (*Quartz crystals, Crystal holders), Crystals, Processing, Phase measurement, Frequency.

Polished and beveled AT cut quartz plates operating on the seventh and ninth overtones were fabricated. Discussion is presented on the problems encountered in fabricating higher magnitude overtones. A crystal holding jig was manufactured with optimum holding features and ease of changing units during the phase measuring. Data is presented showing phase ,stability of the seventh and ninth overtone crystal units, during vibration along the 3 major axes of the crystal unit. (Author)

SC-DC-64-1154 **Field 9C**
CFSTI Prices: HC$1.00 MF$0.50
Westinghouse Electric Corp., Newbury Park, Calif. Molecular Electronics Div.
SILICON MONOLITHIC RANDOM PULSE GENERATOR,
by L. Wang, H. Robertson, and K. K. Schuegraf.Oct 64, 19p CONF-793-3
Contract AT (29-1)-789
Prepared for presentation at Electron Devices Meeting, Washington, D. C., Oct. 1964.

Descriptors: (*Pulse generators, Silicon), (*Molecular electronics, Pulse generators).

AD-419 846 **See Field 20C**

AD-436 042 **See Field 14B**

AD-472 738 **See Field 9A**

AD-634 129 **See Field 9A**

AD-634 130 **See Field 9A**

AD-634 242 **See Field 8C**

AD-634 272 **See Field 12B**

AD-634 290 **See Field 14B**

AD-634 309 **See Field 12B**

AD-634 388 **See Field 10C**

AD-634 740 **See Field 20C**

PB-169 446 **See Field 1C**

PB-169 989 **See Field 14B**

PB-169 990 **See Field 14B**

PB-169 991 **See Field 14B**

PB-169 992 **See Field 14B**

PB-169 993 **See Field 14B**

PB-169 994 **See Field 14B**

PB-169 995 **See Field 14B**

PB-169 996 **See Field 14B**

PB-169 997 **See Field 14B**

PB-169 998 **See Field 14B**

PB-169 999 **See Field 14B**

PB-170 202 **See Field 14B**

PB-170 203 **See Field 14B**

PB-170 204 **See Field 14B**

PB-170 205 **See Field 14B**

PB-170 206 **See Field 14B**

PB-170 207 **See Field 14B**

PB-170 208 **See Field 14B**

PB-170 209 **See Field 14B**

PB-170 210 **See Field 14B**

UCRL-13160 **See Field 14B**

UCRL-13160 **See Field 14B**

9D. INFORMATION THEORY

AD-404 621 **Field 9D**
CFSTI Price: HC$1.10
Lincoln Lab., Mass. Inst. of Tech., Lexington.
THRESHOLDS FOR SEVERAL ANALOG MODULATION SYSTEMS,
by B. Reiffen. 6 May 63, 8p 25G-20
Contract AF 19 (628)-500

Descriptors: (*Information theory, Noise (Radio)), Noise (Radio), Communication systems, Signals, Signal-to-noise ratio, Frequency modulation, Discriminators, Amplitude modulation, Detectors, Analog systems.

The onset of a threshold in communication systems is a familiar phenomenon. Threshold is defined as an abrupt degradation in performance when the s/n ratio at the input to the detector falls below some more or less critical level. Two common examples are: (1) the conventional FM threshold when a discriminator is the detector for angle-modulated signals, and (2) the small-signal suppression effect when power law detectors are used for AM signals. This report is intended as a compilation of selected works of others on the thresholds of several analog modulation schemes operating in additive white, gaussian noise. One threshold curve derived from information theory considerations, may be interpreted as representing the best possible performance of a broad class of modulation-demodulation schemes. The remaining threshold curves refer to angle modulation and various demodulators. (Author)

AD-634 147 **Field 9D**
CFSTI Prices: HC$2.00 MF$0.50
Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
INFORMATION CONTENT OF LIST-DETECTED FADING M-ary TRANSMISSIONS.
Physical sciences research papers,
by John N. Pierce. Apr 66 40p AFCRL-PSRP-211, AFCRL-66-235
Proj. AF-5628
Task 562805

Descriptors: (*Information theory, *Decoding), Attenuation, Signals, Detection, Decision theory.

Identifiers: M-ary transmission.

The channel capacity achievable for M-ary transmission over a Rayleigh fading channel is analyzed for the Wozencraft-Kennedy list-detection scheme. Calculated capacities are given for both list-detection and decision-detection for several SNRs and for several alphabet sizes ranging up to 4096. In addition, small and large SNR asymptotic expressions for the capacity are given for decision-detection, list-detection and likelihood-detection. The maximum capacity for arbitrarily large alphabet size is determined. (Author)

AD-634 148 **See Field 5A**

AD-634 182 **See Field 17B**

AD-634 304 **See Field 9B**

AD-634 369 **See Field 9A**

AD-634 378 **See Field 20A**

AD-634 526 **See Field 9B**

AD-634 564 **See Field 17I**

PB-170 419 **See Field 5B**

9E. SUBSYSTEMS

AD-409 448 **Field 9E**
CFSTI Price: HC$7.60
Stanford Research Inst., Menlo Park, Calif.
NOVEL MICROWAVE FILTER DESIGN TECHNIQUES.
Quarterly progress rept. no. 1, 1 Jan-31 Mar 63,
by G. L. Matthaei, E. G. Cristal, L. A. Robinson, and B. M. Schiffman. Apr 63, 79p
Contract DA-36-039-AMC-00084 (E)
Proj. SRI-4344

Descriptors: (*Radiofrequency filters, Microwave equipment), Design, Band-pass filters, Garnet, Ferromagnetic materials, Varactor diodes, Tuning devices.

The results of a mathematical study of a proposed multiplexer design technique are presented. A separate channel unit is used for each channel to be separated out; each unit consists of a band-stop and a band-pass filter. It is shown that such units can be designed to have a constant-resistance input impedance; hence, they can be cascaded without interaction effects. Design techniques for magnetically tunable band-stop filter using ferrimagnetic garnet resonators are considered. Design for prescribed response is outlined. Use of band-stop filter techniques for measuring linewidth of garnet materials is also discussed. The use of varactor diodes for tuning transmission line resonators for a proposed form of band-pass-filter phase shifter is discussed. Experimental results are reported from a trial interdigital filter with capacitively loaded resonators. (Author)

AD-410 580 **Field 9E, 11C**
CFSTI Price: HC$6.60
Eitel-McCullough, Inc., San Carlos, Calif.
RESEARCH ON MICROWAVE WINDOW MULTIPACTOR AND ITS INHIBITION.
Quarterly progress rept. no. 3, 1 Jan-31 Mar 63,
by Oskar Heil. 31 Mar 63, 65p
Contract DA-36-039-sc-90818
Task OST 76-10-318-28-03

Descriptors: (*Waveguide windows, Microwave equipment), Surfaces, Radiofrequency power, Inhibition, Performance (Engineering), Electron tubes, Ceramic coatings, Metal coatings, Electron bombardment.

Contents: (1) An Experimental Study of Electron Bombardment Phenomena at the Output RF Windows of High Power Microwave Tubes; and (2) Study of the Inner-Window Surface and Configurations Affecting Power Handling Capabilities of High Power Microwave Tubes.

AD-443 377 **Field 9E, 11C**
CFSTI Price: HC$5.60
Eitel-McCullough, Inc., San Carlos, Calif.
RESEARCH ON MICROWAVE WINDOW MULTIPACTOR AND ITS INHIBITION.
Quarterly progress rept. no. 7, 1 Jan-31 Mar 64,
by Raymond Hayes. 31 Mar 64, 60p
Contract DA-36-039-sc-90818
Task 1G6-22001-A-055-04

Descriptors: (*Ceramic coatings, Waveguide windows), (*Waveguide windows, Electric discharges), (*Electric discharges, Inhibition), Ceramic coatings, Titanium compounds, Oxides, Metal coatings, Performance (Engineering).

Titanium suboxide coatings for the suppression of multipactor discharges at microwave windows have been evaluated, on alumina and beryllia ceramics. Coatings were applied by evaporating titanium in vacuum, by sputtering titanium monoxide in argon, and by spraying a suspension of titanium dioxide particles on to the window and subsequently heating in a hydrogen furnace. Measurement of surface resistivity appears to be the best method of controlling coating thickness. Evaporated and sputtered coatings of various thickness were tested and the range most suitable for multipactor suppression determined. Gases evolved during a multipactor discharge at an alumina surface have been analyzed by a Diatron mass spectrometer. The results indicate that gas evolution is due to a protracted outgassing process. Tests on a grooved beryllia window showed that the grooving technique is not suitable for suppressing multipactor at beryllia surfaces. Experiments with a flanged ceramic window (H type) show that this design is capable of supporting higher peak powers than those possible with circular disc windows. (Author)

AD-453 195 **Field 9E, 22C**
CFSTI Price: HC$20.00
General Electric Co., Pittsfield, Mass. Ordnance Dept.
STUDY OF ANTENNA AXIS CONFIGURATIONS FOR SATELLITE TRACKING AND CONTINUED STUDY OF TRANSPORTABLE ANTENNA SYSTEMS. VOLUME I.
Final quarterly rept. no. 4, 1 Apr-30 Jun 64,
by M. Howe, B. Wilbur, W. Neubert, C. Wales, and A. Clark. 23 Nov 64, 204p
Contract DA-36-039-AMC-03333 (E)
Proj. DA-62230-PM-63-91-(6127)

Descriptors: (*Satellite tracking systems, Antennas), (*Antenna configurations, Satellite tracking systems), (*Antennas, Satellite tracking systems), Communication satellites (Active), Communication satellites (Passive), Tracking, Parabolic antennas, Superhigh frequency, Reliability (Electronics), Maintainability, Mobility, Radar antennas.

The purpose of this study was to select the best state-of-the-art axis configuration for transportable communications satellite tracking antennas, and to supply design information for this selection. The guide line for the study was Signal Corps tracking antenna Specification SCA 2013. The major requirements of this specification are: track communications satellites 500 to 22,400 miles high; thirty-foot parabolic reflector; transportable in military semi-trailers, and C-124 and C-133 aircraft; operating frequency of 8.0 kMc; and pointing accuracy of 0.057 degree. Axis configurations utilized by existing tracking antennas were surveyed and their parameters tabled for comparison. Forty-one tracking antennas were surveyed, and are listed. A theoretical survey of possible axis configurations was conducted to determine the optimum geometrical configurations suitable for satellite tracking. Six of the most promising state-of-the-art configurations were selected, and an analytical study of these were conducted. Those studied were the A-E (narrow and wide yoke); the X-Y; and the differential and 3-axis mounts. A comparison of the analytical study is presented in tabular form, supplemented by brief summaries for each attribute compared. (Author)

AD-453 196 **Field 9E, 22C**
CFSTI Prices: HC$13.60
General Electric Co., Pittsfield, Mass. Ordnance Dept.
STUDY OF ANTENNA AXIS CONFIGURATIONS FOR SATELLITE TRACKING AND CONTINUED STUDY OF TRANSPORTABLE ANTENNA SYSTEMS VOLUME II.
Final quarterly rept. no. 4, 1 Apr-30 Jun 64,
by M. Howe, B. Wilbur, W. Neubert, C. Wales, and A. Clark. 23 Nov 64, 131p
Contract DA-36-039-AMC-03333 (E)
Proj. DA-62230-PM-63-91-(6127)

Descriptors: (*Satellite tracking systems, Antennas), (*Antenna configurations, Satellite tracking systems), (*Antennas, Satellite tracking systems), Radar antennas, Tracking, Structural parts, Supports, Torque, Radar reflectors, Alignment, Power, Electric motors, Transportation, Errors, Drives, Weight, Construction, Anchors (Structural), Hydraulic systems, Wind, Servomechanisms, Servomotors, Specifications.

Contents: Preliminary Designs; Thirty-Foot Antenna, Differential Axis; Manufacturing Considerations; Cable-Driven Differential Mount Power Drives, Gear Train Design Specifications, and Transportability and Erection, Thirty-Foot Antenna, X-Y Axis; Structural and Mechanical Design; X-Y Mount Power Drives; and Transportation; and Three-Axis Triax. (Author)

AD-453 197 **Field 9E, 22C**
CFSTI Prices: HC$11.60
General Electric Co., Pittsfield, Mass. Ordnance Dept.
STUDY OF ANTENNA AXIS CONFIGURATIONS FOR SATELLITE TRACKING AND CONTINUED STUDY OF TRANSPORTABLE ANTENNA SYSTEMS VOLUME III.
Final quarterly rept. no. 4, 1 Apr-30 Jun 64,
by M. Howe, B. Wilbur, W. Neubert, C. Wales, and A. Clark. 23 Nov 64, 120p
Contract DA-36-039-AMC-03333 (E)
Proj. DA-62230-PM-63-91-612

Descriptors: (*Satellite tracking systems, Antennas), (*Antenna configurations, Satellite tracking systems), (*Antennas, Satellite tracking systems), Radar antennas, Communication satellites (Active), Tracking, Transportation, Parabolic antennas, Wind, Hysteresis, Alignment, Collimators, Solar radiation, Eoors, Misalignment, Reliability (Electronics).

Contents: Environmental Conditions, Analysis of Wind Loads, Tracking Antenna Drives - Low Velocity Error, Alignment and Collimation, and Reliability and Availability.

AD-456 845 **Field 9E**
CFSTI Price: HC$3.60
General Electric Co., Auburn, N. Y. Semiconductor Products Dept.
THE DEVELOPMENT AND EVALUATION OF A BILATERAL TRIODE SWITCH.
Quarterly progress rept. no. 3, 13 Oct 64-13 Jan 65,
13 Jan 65, 39p
Contract NObsr-91151
Proj. SR-0080304
Task 9348
Document includes Appendix A, Conference Paper, Digital Computer Calculation of Rectifier and Silicon Controlled Rectifier Ratings, by C. D. Mohler. CP-62-433.

Descriptors: (*Electronic switches, Transistor), (*Semiconductor devices, Electronic switches), (*Transistors, Electronic switches), Diodes (Semiconductor), Crystal rectifiers, Silicon, Resistance (Electrical), Voltage, Theory, Alternating current, Electrodes, Equations, Mathematical analysis, Heat transfer.

This quarterly report describes the work performed toward the development of an improved bilateral triode p-n-p-n switch. A model of the heat flow paths within the device is developed and its feasibility as well as its applicability to established computer - performed rating procedures is shown. Contacting and mountdown methods are discussed. (Author)

AD-634 153 **Field 9E**
CFSTI Prices: HC$3.00 MF$0.75
Antenna Lab., Calif. Inst. of Tech., Pasadena.
A STUDY OF CROSS POLARIZATION EFFECTS IN PARABOLOIDAL ANTENNAS.
Technical rept.,
by Vassilios Kerdemelidis. May 66, 98p TR-36
Contract AF 49 (638)-1266

Descriptors: (*Parabolic antennas, Polarization), Antenna feeds, Microwaves, Numerical analysis, Wave transmission, Electric fields, Antenna lobes, Dipole antennas, Horn antennas, Antenna apertures.

The induced surface current method is used to investigate the spatial structure of the radiated electric field for a number of paraboloidal antennas.

The paraboloids are excited by three different types of feeds, namely, a small electric dipole, an elemental plane wave source, and a rectangular horn. For the case of electric dipole excitation, formulas are derived that show the following characteristics: (i)For a reflector of constant ratio of focal length to the aperture diameter the magnitude of the cross-polarized lobe nearest to the antenna axis (paraboloid axis) remains constant relative to the maxium of the main lobe of the principally-polarized wave and is independent of the aperture size. (ii)For a given aperture size the magnitude of the cross-polarized component relative to its own principally-polarized maximum decreases with the focal length. (iii)The position of the maximum of the cross-polarized lobe depends only on the aperture size and is independent of the focal length. For a paraboloid excited by an elemental Huyghens source the cross-polarization in the forward direction is reduced but the component in the laterally-directed radiation is increased relative to that of an electric dipole. In the case of the horn-excited paraboloid a formula is obtained that explains the experimentally-observed large cross-polarization. Finally, it is shown that the problems of the paraboloids excited by a small electric dipole and a plane (Huyghens) source are merely particular cases of the horn excitation problem. (Author)

AD-634 155 **Field 9E**
CFSTI Prices: HC$2.00 MF$0.50
Air Force Cambridge Research Labs., D. G. Hanscom Field, Mass.
ANTENNA POINTING REQUIREMENTS FOR SATELLITE TRACKING.
Instrumentation papers,
by Joseph A. Short Jr. Feb 66, 41p AFCRL-IP-91, AFCRL-66-100
Proj. AF-4600
Task 460011

Descriptors: (*Tracking, Antennas), (*Antennas, Millimeter waves), Antenna compounds, Control systems, Satellites (Artifical), Errors, Tables, Graphics, Performance (Engineering).

In order to determine the satellite tracking capability of an azimuth-elevation antenna mount, a simplified model for satellite motion is presented. Satellite azimuth and elevation positional equations versus time are derived and the results of a computer program to determine velocity and acceleration are presented in both tabular and graphical forms. In terms of the results obtained the satellite tracking performance of the AFCRL 29-Foot Millimeter Wave Antenna is evaluated. (Author)

AD-634 520 **Field 9E**
CFSTI Prices: HC$3.00 MF$0.75
Bendix Corp., Davenport, Iowa. Pioneer-Central Div.
DESIGN AND DEVELOPMENT OF FREQUENCY TEMPERATURE COMPENSATED QUARTZ CRYSTAL OSCILLATOR 0-1227 ( )/U.
Rept. no. 2, 1 Apr 64-30 Sep 65 (Final),
by C. D. Dominguez. 30 Sep 65, 87p Publication-3437-65
Contract DA-28-043-AMC-00042 (E)
Proj. DA-1P6-220001-A-058
Task 1P6-22001-A-058-02-13
ECOM-00042-F
See also AD-617 787.

Descriptors: (*Crystal oscillators, Quartz), Reliability (Electronics), Design, Frequency, Stabilization, Aging (Materials), High frequency, Temperature, Thermal properties, Stability.

The need for ovenless quartz crystal oscillators having a deviation less than plus or minus 0.75 parts per million from an absolute frequency over all service conditions, including crystal aging, has been evident for modern communications systems. Knowledge derived from studies on frequecy temperature compensation techniques indicated the feasibility of developing compensated oscillators providing a reduction in both required input power and size over conventional oscillator-oven assemblies. The object of Phase I of this program was to design and fabricate seven exploratory development oscillator models employing such compensation techniques to achieve a frequency stability of less than plus or minus 0.5 ppm over the temperature range of -40C to +65C. This effort was reported in the Phase I Interim Report under this contract. After evaluation of these exploratory models, 18 advanced models were designed and fabricated under Phase II of this program with the same stability over -40C to +75C. This report covers the effort expended and the results obtained during Phase II of this program. The discussion in this report is related to (1) description and test of the Phase II oscillators, (2) design considerations in formulation of Phase II design, (3) component standardization, and (4) overall conclusions and recommendations for this program. (Author)

AD-634 663 **Field 9E, 17B**
CFSTI Prices: HC$1.00 MF$0.50
Army Electronics Command, Fort Monmouth, N. J. Electronic Warfare Lab.
A NEW TYPE OF BROADBAND LOW NOISE RADIO FREQUENCY AMPLIFIER,
by Herbert Brett. Jun 66, 10p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Radiofrequency amplifiers, Phase shift), Broadband, Noise (Radio), Varactor diodes, Radio receivers, Signal-to-noise ratio, Pumping (Electronics), Television receivers.

Identifiers: Phase shift amplifiers.

The paper will discuss an amplifier based on a new technique which provides significant improvement in receiver sensitivity. As an RF amplifier it is capable of very wide bandwidth gain with very low noise figures, - less than 1 db at room temperature. Other features are large dynamic range, singular freedom from spurious output, and both open and short circuit stability. The technique has come to be known as phase shift amplification and the device itself as the Phase Shift Amplifier. In a sense it is parametric. It is a device in which the phase of an R. F. signal is made to vary by passing it through an energy storage medium whose properties vary with the input signal voltage. One common form of energy storage element is a voltage variable capacitor, or varactor diode, as the high frequency semiconductor device is known.

AD-634 689 **Field 9E, 9A**
CFSTI Prices: HC$1.00 MF$0.50
Army Electronics Command, Fort Monmouth, N. J. Electronic Components Lab.
A NEW MICROWAVE SEMICONDUCTOR OSCILLATOR,
by V. J. Higgins, F. A. Brand, and J. J. Baranowski. Jun 66, 15p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Microwave oscillators, *Varactor diodes), Gallium alloys, Arsenic alloys, Semiconductor devices, Performance (Engineering), Microwave amplifiers, Radiofrequency power, X band, K band, Silicon.

Identifiers: Gallium arsenide.

Epitaxial GaAs varactor diodes featuring low junction capacitance and series resistance oscillate when reverse biased into avalanche. The oscillations are both of a pulsed and continuous nature. CW outputs in excess of 25 mW with over 5% efficiencies in the 13 GHz range have been obtained on a reproducible basis. Tunability has been demonstrated with oscillation bandwidths of 6 to 10% recorded in both X- and K sub u-bands. In addition, CW oscillations of more than 0.5 mW in less than optimum circuitry have been observed at frequencies above 30 GHz. CW and pulsed oscillations have also been observed using silicon p-n junction avalanche oscillators. However, rf output and efficiencies are on an order of magnitude less than that obtained with GaAs units.

AD-634 764 **Field 9E**
CFSTI Prices: HC$3.00 MF$0.75
Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
CATEGORIZATIONS AND REALIZATIONS OF POSITIVE REAL AND BIQUADRATIC IMMITTANCE FUNCTIONS.
Physical and mathematical sciences research papers,
by Kurt H. Haase. Apr 66, 92p AFCRL-PMSRP-215, AFCRL-66-243
Proj. AF-5628
Task 562806

Descriptors: (*Electrical networks, Synthesis), Admittance, Electrical impedance, Model theory, Circuits.

It is shown that a positive real immittance function F (s) is of one of eight categories. The category can be recognized by the sign polarities of three test values that are functions of the coefficients of F (s). If F (s) is of a certain category, then 1/F (s) can only be of some other categories. According to the categories of F (s) and 1/F (s) the immittance function can be realized (1) either by an RC or an RL network with positive elements, (2) by an RLC network with exclusively positive elements and an equivalent model circuit, or (3) only by model circuits. A model circuit is an RLC ladder structure with one negative branch element. The RC, RL, RLC, and model circuits have several equivalences. (Author)

AD-634 148 **See Field 5A**

AD-634 366 **See Field 12B**

AD-634 367 **See Field 12B**

AD-634 516 **See Field 20C**

AD-634 742 **See Field 17I**

AD-634 744 **See Field 9A**

SCL-DC-65-112 **See Field 18D**

TID-21719 **See Field 18E**

9F. TELEMETRY

AD-268 358 **Field 9F**
CFSTI Price: HC$12.60
American Electronic Labs, Inc., Colmar, Pa.
ANTENNA GROUP AN/TLA-8 (XE-2).
Final rept. 1 Jul 58-15 Aug 61.
15 Aug 61, 124p
Contract DA-36-039-sc-78063
Proj. DA-3-44-04-501

Descriptors: (*Antennas, Tests), (*Dipole antennas, Tests), Antenna configurations, Broadband, Very high frequency, Antenna radiation patterns, Transmission lines, Standing wave ratios, Antenna masts.

Identifiers: AN/TLA-8.

Three service test models were developed which incorporated the latest in the state-of-the-art dealing with planar log periodic antennas. A sophisticated but simple vertical erection mast system was evolved which is capable of raising or lowering the antenna on a tripod or when mounted on a stationary, standard military vehicle. In certain areas, some of the specification requirements were ex-

ceeded. The antenna group AN/TLA-8 (XE-2) service test models provides are suitable for field testing. (Author)

AD-474 530 **Field 9F**
CFSTI Prices: HC$7.60 MF$0.75
Range Commanders Council, White Sands Missile Range, N. Mex. Telemetry Working Group.
TELEMETRY STANDARDS (REVISED JULY 1965).
Nov 65, 71p Report. no. 106-65
Rept. on Frequency Standards for Telemetry.

Descriptors: (*Telemeter systems, Standards), Guided missile ranges, Ranges (Establishments), Test facilities, Frequency, Response, Electromagnetic compatibility, Multiplex, Frequency modulation, Pulse duration modulation, Pulse modulation, Pulse amplitude modulation, Pulse code modulation, Magnetic recording systems, Magnetic tape.

It is the purpose of this revision to delineate the obtainable performance of modern telemetry systems within the limits of practical design and use. These standards, therefore, do not necessarily define the existing capability of any test range but rather constitute a guide of the implementation and orderly application of telemetry systems for both the ranges and range users within the limits of good design practice. The broader range of capabilities attainable under these standards require more careful consideration of tradeoffs (e.g., frequency response versus accuracy) than heretofore. Guidance to the user in this consideration is provided in the appropriate appendices to these standards. These telemetry standards were established to further the compatibility of airborne transmitting equipment and ground receiving and data-handling equipment at the test ranges. (Author)

AD-634 368 **Field 9F, 16D**
CFSTI Prices: HC$2.00 MF$0.50
Naval Ordnance Lab., Corona, Calif.
DESIGN OBJECTIVES FOR TELEMETRY R-F TRANSMISSION LINKS FOR THE PERIOD 1960 TO 1970. REVISION NO. 3,
by T. B. Jackson. 15 Apr 66, 43p
Task RMWC-54-154/211-1/F099-05-01
NAVWEPS-8850
AD-400 742 superseded.

Descriptors: (*Telemeter systems, Data links), Ultra high frequency, Telemetering transmitters, Telemetering receivers, Telemetering antennas, Specifications, Guided missiles, Military requirements, Navy equipment, Design.

Performance characteristics, design limitations, and special operational features required in a general-purpose UHF telemetry transmission link are presented. Separate consideration is given to the transmitter, power amplifier, preamplifier-converter, distribution amplifier, channel-selection receiver, and receiving antenna portions of the link. Flexibility of operation and provision for adapting the ground station complex to several basic applications are emphasized. (Author)

N66-14528 **Field 9F**
CFSTI Prices: HC$7.00 MF$1.75
Collins Radio Co., Dallas, Tex.
DESIGN ANALYSIS - UNIFIED S-BAND SYSTEM FOR APOLLO NETWORK, VOLUME 1, PARTS I AND II.
Engineering rept.
28 Oct 64, 353p Rept. no. 523-0556527-001D3M, Vol. 1
Contract NAS5-9035
NASA-CR-69085

Descriptors: *Apollo project, *Performance characteristics, *S-band, *Subsystem, *Systems design.

For abstract, see T 66 15.

N66-14529 **Field 9F**
CFSTI Prices: HC$3.00 MF$0.50
New Mexico State Univ., University Park. Physical Science Lab.
THE DESIGN AND PERFORMANCE OF MODEL 2.041 QUADRALOOP TELEMETRY ANTENNAS FOR THE NASA JAVELIN, FLIGHT 12.03.
6 May 64, 59p
Contract NAS5-3318
NASA-CR-69095

Descriptors: *Javelin rocket, *Loop antenna, *Electric impedance, *Telemetry.

N66-14530 **Field 9F**
CFSTI Prices: HC$5.00 MF$1.00
Collins Radio Co., Dallas, Tex.
DESIGN ANALYSIS - UNIFIED S-BAND SYSTEM FOR APOLLO NETWORK, VOLUME 2, PARTS III, IV, AND V.
Engineering rept.
28 Oct 64, 181p Rept. no. 523-0556527-001D3M Vol 2
Contract NAS5-9035
NASA-CR-69094

Descriptors: *S-band, *Systems design, *Apollo project, *Equipment specifications.

N66-16070 **Field 9F**
CFSTI Prices: HC$6.00 MF$1.50
Chrysler Corp., Huntsville, Ala.
SATURN ANTENNA SYSTEMS, SA-5, VOLUME 3,
18 Jun 63, 283p
Contract NAS8-4016
NASA-CR-69697

Descriptors: *Antenna array, *Radar antenna, *Saturn I.

10A. CONVERSION TECHNIQUES

AD-418 281 **Field 10A, 20I**
CFSTI Price: HC$1.10
Martin Co., Baltimore, Md. Nuclear Div.
RESEARCH PROGRAM ON CLOSED-CYCLE MAGNETOPLASMADYNAMIC ELECTRICAL POWER GENERATION WITH NON-EQUILIBRIUM IONIZATION.
Quarterly rept. no. 5 for 15 Sep 63,
by M. E. Talaat. 15 Sep 63, 8p MND-2866-5
Contract Nonr-3866 (00), ARPA order-326-327
Proj. NR-9800

Descriptors: (*Magnetohydrodynamic generators, Tests), Gas ionization, Power sources, Plasma medium, Helium, Cesium, Impurities, Diodes.

The objectives of this program are: (1) To demonstrate experimentally the principle of non-equilibrium ionization under actual closed-cycle magnetoplasmadynamic (MPD) generator operating conditions; (2) To study the behavior of moving ionized gases in the non-equilibrium state, when interacting with a magnetic field, by correlating the experimental results with the theory of non-equilibrium ionization and with the theory of the MPD power generation; and A closed-cycle MPD electrical power generator research loop was fabricated and erected, a theory of the MPD power generation with non-equilibrium ionization was developed and is being correlated with experiments on cesium-seeded helium diodes and the performance of the closed-cycle MPD electrical power generator with non-equilibrium ionization is being studied and analyzed. (Author)

TID-22350 **Field 10A, 22B, 18L**
CFSTI Prices: HC$4.00 MF$1.00
Radio Corp. of America, Princeton, N. J. Astro-Electronics Div.
HIGH-TEMPERATURE RADIOISOTOPE THERMOELECTRIC GENERATOR FOR SPACE APPLICATIONS.
31 Dec 64, 134p AED-R-2621
Contract AT (40-1)-3221

Descriptors: (*Radioactive isotopes, Thermoelectricity), (*Spacecraft, Nuclear propulsion).

For abstract, see N 20 12.

AD-634 528 **See Field 20L**

10B. POWER SOURCES

AD-296 802 **Field 10B**
CFSTI Price: HC$4.60
Magna Corp., Anaheim, Calif. Research and Development Labs.
BIOCHEMICAL FUEL CELLS.
Quarterly progress rept. no. 1, 1 Jul-30 Sep 62.
30 Sep 62, 50p
Contract DA-36-039-sc-90866
Task 3A-99-09-001-01

Descriptors: (*Fuel cells, Biochemistry), (*Bacteria, Fuel cells), Clostridium, Gas generating systems, Escherichia coli, Catalysts.

Identifiers: Biochemical fuel cells.

Studies of the biochemical influence on electrochemical phenomena were initiated as part of a program leading towards the development of biochemical fuel cells. Biochemical systems selected for study include the biocatalysts Clostridium butyricum, a cell free extract of Escherichia coli, glucose oxidase, urease, Bacillus pasteurii, and L-amino acid oxidase. Cultural and physiological studies of the Clostridium butyricum and Escherichia coli were started. The effects of pH, temperature, substrate concentration and salt content on gas evolution by the Clostridium butyricum are reported. Physiological and cultural studies of Escherichia coli established that E. coli could be grown on a basal medium supplemented by yeast extract. Several urease coated electrodes were prepared by compressing carbon mixtures. The evidence indicates the need of a binder to increase the mechanical strength of the electrode and a catalyst for the oxidation of the ammonia formed. (Author)

AD-455 564 **Field 10B**
CFSTI Price: HC$2.00
Engelhard Industries, Inc., Newark, N. J. Research and Development Div.
FUEL CELL CATALYSTS.
Quarterly rept. no. 3, 1 Jun-31 Aug 64,
by O. J. Adlhart. 28 Dec 64, 44p
Contract DA-36-039-AMC-03700 (E)
Task 1G6-22001-A-053-04

Descriptors: (*Fuel cells, Catalysts), (*Catalysts, Fuel cells), Phosphoric acid, Sulfuric acid, Tantalum compounds, Tungsten compounds, Boron compounds, Carbides, Silicides, Borides, Oxides, Carbon, Thermal stability, Electrodes, Porous materials, Surface area, Particle size, Platinum alloys, Rhenium alloys.

Identifiers: Boron carbide, Tantalum oxide, Tantalum oxide, Tungsten oxides.

A survey and evaluation of carrier materials for electro catalysts operable in concentrated phosphoric and sulfuric acid electrolytes was carried out involving besides carbon, carbides, silicides, borides and oxides. Promising chemical stability is exhibited by tantalum silicide, tantalum oxide, tungsten oxide, tungsten carbide and boron carbide. Carbon is chemically stable and remains also not corroded after activation with platinum at temperatures up to 200C and anodic potentials of at least up to .5 volts vs. hydrogen. Carbon is rapidly oxidized, however, at potentials of cathode operation. The performance, thermal stability and life

of precious metal catalysts is materially affected by the pore structure, surface area and particle size of the carrier materials. Substrates of low porosity and small particle size yield catalysts of superior activity. Thermal stability is improved, however, by the use of microporous carriers of high surface areas. Certain platinum-ruthenium alloys may nevertheless be successfully supported on carriers of low porosity due to an unusual, as yet unexplained, stability. (Author)

AD-456 739 **Field 10B**
CFSTI Price: HC$5.00
California Research Corp., Richmond.
AN EVALUATION OF FUEL CELL SYSTEMS FOR MILITARY VEHICLE PROPULSION AND PORTABLE ELECTRIC POWER GENERATION. PART I.
by Maurice J. Schlatter. 1 Feb 65, 175p Special report SR-2
Contract DA-49-136-AMC-149 (D), DA-49-186-AMC-929
N65-17233

Descriptors: (*Fuel cells, Surface propulsion), (*Electric power production, Fuel cells), Vehicles, Engines and motors, Military requirements, Power supplies.

The main objectives of this report are: (1) to evaluate fuel cell power as a possible replacement for most of the internal combustion engines used for military vehicle propulsion and portable electrical power generation, (2) to provide data for judging the feasibilities of fuel cells for certain, more limited, critical applications. Power lost in conversion devices necessary to adapt primary power source energy output to load requirements is discussed and compared for internal combustion engines and fuel cells. Specific data are provided for military internal combustion engines, both gasoline and diesel. Data are given for the engines alone and combined with transmission and with electrical generator. A preliminary comparison of fuel consumption in fuel cells and internal combustion engines is made, assuming 60% fuel cell efficiencies.

AD-461 088 **Field 10B, 7B, 7D**
CFSTI Price: HC$3.00
Monsanto Research Corp., Everett, Mass. Boston Lab.
RESEARCH TO IMPROVE ELECTROCHEMICAL CATALYSTS.
Semiannual progress rept. no. 1, 15 Jun-30 Dec 64,
by J. O. Smith, J. C. Orth, M. C. Deibert, S. Matsuda, and J. J. O'Connell. 15 Jan 65, 56p MRB-4020S1
Contract DA-49-186-AMC-166 (X)

Descriptors: (*Fuel cells, Catalysts), (*Catalysts, Fuel cells), (*Chelate compounds, Catalysts), (*Electrodes, Fuel cells), Synthesis (Chemistry), Electrochemistry, Hydrogen, Methanols, Hydrazine, Propanes, Acetates, Formates, Oxidation, Halocarbon plastics, Membranes.

The immediate goal of the research program is the development of readily available metal chelate catalysts for the electro-oxidation of saturated hydrocarbons at a practical power level and moderate temperature. The report describes the synthesis of 23 metal chelate compounds and the testing of these materials as catalysts for the oxidation of hydrogen, methanol, hydrazine, propane, and acetate and formate ions. The report also covers the development of a Teflon matrix-carbon filled membrane electrode substrate with unusual electrochemical properties. (Author)

AD-461 362 **Field 10B, 7D**
CFSTI Price: HC$9.60
Engelhard Industries, Inc., Newark, N. J. Research and Development Div.
FUEL CELL CATALYSTS.
Final rept. (no. 4), 1 Dec 63-30 Nov 64. 30 Nov 64, 95p
Contract DA-36-039-AMC-03700 (E)
Task 1G6-22001-A053-04

Descriptors: (*Fuel cells, Catalysts), (*Catalysts, Fuel cells), (*Platinum, Catalysis), Hydrocarbons, Oxidation, Platinum alloys, Iridium alloys, Rhodium alloys, Ruthenium alloys, Alkanes, Propane, Alkenes, Carbon dioxide, Ethylenes, Carbon monoxide, Recrystallization, Porosity, Particle size, Thermal stability.

Identifiers: Platinum black, Ethanes, Butylenes.

Pure and alloyed platinum metal catalysts were investigated for the use in fuel cells operable with common hydrocarbon fuels in the temperature range from 80-200C. Among the pure platinum metals platinum black exhibits the highest activity although its surface is smaller than that of iridium or rhodium black. Alloyed platinum catalysts with iridium, rhodium and ruthenium have a higher surface area than pure platinum which, however, may not always be fully usable. Catalysts of the platinum ruthenium system which possess high surface areas and relatively large average pore sizes are uniquely active. Gas chromatographic measurements showed complete oxidation to carbon dioxide of ethane, propane and butene. With ethylene, however, a small amount of carbon monoxide was also formed. Catalysts recrystallize slowly under conditions of fuel cell operation. Substrates of low porosity and small particle size yield catalysts of superior activity. Thermal stability is improved, however, by the use of microporous carriers of high surface areas. Carrier materials to be considered are tantalum, tungsten or selected carbides, silicides or carbon.

AD-634 241 **Field 10B, 7D**
CFSTI Prices: HC$2.60 MF$0.50
Tyco Labs., Inc., Waltham, Mass.
ELECTROCHEMISTRY OF FUEL CELL ELECTRODES.
Final techaical summary rept.,
by A. I. Mlavsky. 27 Apr 62, 23p
Contract NObs-84770, ARPA Order-204-61
Proj. SR-007-12-01
Task 809
See also AD-278 496.

Descriptors: (*Fuel cells, Electrodes), (*Electrodes, Electrochemistry), Nickel compounds, Oxides, Sulfides, Nickel, Nickel alloys, Arsenic alloys, Antimony alloys, Silicon alloys, Intermetallic compounds, Polarization, Corrosion, Palladium, Hydrogen, Oxygen, Diffusion.

In an attempt to correlate electrode behavior with the electronic properties of electrode materials with incompletely occupied d-orbitals, a number of intermetallic compounds containing nickel together with an electronegative element from groups IV-B, V-B, and VI-B of periodic tables, were synthesized and evaluated as electrode materials. NiO, NiS, NiAs, NiSb, NiSi and elemental nickel in the massive form have been studied in N2, O2 and H2 atmospheres in both alkaline and acid perchlorate media. Anodic and cathodic polarization measurements were made. Polarization was pronounced at moderate current densities. Participation of O2 and H2 was poor and the corrosion reactions was prominent. The cathodic hydrogen evolution reaction on these electrodes is discussed. The use of palladium as a support material for quick permeation of hydrogen and avoiding the three-phase interface problem is discussed. Results of the effect of various treatment of the palladium surface on the permeation of hydrogen are presented and discussed. (Author)

AD-634 477 **Field 10B, 20C, 11F, 13D K**
CFSTI Prices: HC$5.60 MF$0.50
General Electric Co., West Lynn, Mass. Direct Energy Conversion Operation.
RESEARCH AND DEVELOPMENT OF MATERIALS AND FABRICATION TECHNIQUES FOR THERMOELECTRIC POWER GENERATION.
Quarterly progress rept. nos. 1, 2, 1 Jan-31 Jul 62. 30 Oct 62, 56p
Contract NObs-86854
Proj. SR-007-12-01
Task 802
See also AD-404 781.

Descriptors: (*Thermoelectricity, *Materials), Power supplies, Thermocouples, Packaging, Containers, Lead alloys, Electric power supplies, Tellurium alloys, Magnesium alloys, Antimony alloys, Thermal conductivity.

Identifiers: Thermoelectric generators, Lead telluride, Magnesium antimonide.

Progress is reported on the design, fabrication and evaluation of a lead teluride thermocouple cartridge. Mg3Sb2 preparted in a sealed bomb came within 1 atomic % of exact stoichiometry but contained a Sb-Mg3Sb2 eutectic concentration of about 1.8% by volume. The room temperature thermal conductivities of several nearly stoichiometric specimens of Mg3Sb2 were measured by the Powell comparator method. The average of seven determinations made on four different specimens was .013 watt/cm degree C, vs. a reported value of about .010 watt/cm degree C for the thermal conductivity of the pure compound. The known volume concentrations of eutectic in the specimens fully account for the discrepancy. The room temperature thermal conductivity of Minnesota Mining and Manufacturing Company TEG-2P p-type PbTe, as measured in the same aparatus, is .023 watt/cm degree C, and it can be shown that the value for stoichiometric Mg3Sb2 doped to a resistivity of 0.001 ohm cm would be only about .012 to .013 watt/cm degree C. On this basis, there seems to be reasonable promise that Mg3Sb2 can be developed into a superior p-type thermeoelectric material.

AD-634 538 **Field 10B**
CFSTI Prices: HC$3.00 MF$0.75
Radio Corp. of America, Lancaster, Pa. Direct Energy Conversion Dept.
THE DEVELOPMENT OF A FLAME FIRED THERMIONIC GENERATOR.
Summary technical rept., 15 Mar 65-15 Apr 66,
by W. B. Hall. 15 Apr 66, 95p
Contract DA-44-009-AMC-998T
ERDL-998T-2
See also AD-629 762.

Descriptors: (*Thermionic converters, Feasibility studies), (*Fuels, Thermionic converters), (*Generators, Thermionic converters), Pipes, Heaters, Electric power production, Heat exchanger, Flames, Performance (Engineering).

The report covers a program to investigate components for flame fired thermionic energy conversion systems. The objective of the program is to demonstrate the feasibility of integrating a thermionic converter with a barrier layer and a heat pipe to obtain 1500 hour reliability of the assembly. A basic subassembly was designed to deliver 100 electrical watts from the thermal energy of a fossil fuel flame operating in an air environment. Twelve of these units would be used in the one kilowatt power module. Problems of heat transfer, permeation barrier integration, heat pipe processing and closure, and burner temperature uniformity were encountered and substantially reduced or eliminated. After the separate components were evaluated and determined to be satisfactory, a fossil fuel-heated converter was assembled which delivered 100 watts of power during testing.

AD-634 677 **Field 10B**
CFSTI Prices: HC$1.00 MF$0.50
Army Engineer Research and Development Labs., Fort Belvoir, Va.
A HYDROCARBON-AIR FUEL CELL USING AN ACID ELECTROLYTE,
by Galen R. Frysinger. Jun 66, 11p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N.

Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Fuel cells, *Hydrocarbons), (*Electrolytes, Fuel cells), Phosphoric acid, Oxidation, Electrochemistry, Anodes, Hydrogen, Gasoline, Air.

A new fuel cell concept which utilizes a phosphoric acid electrolyte offers a highly compact fuel cell assembly which can be used in a very highly simplified system for the generation of d.c. electrical power from hydrocarbon fuels. Either the hydrocarbon can be reacted directly at the electrodes in an anodic oxidation reaction or the active hydrogen of the hydrocarbon molecule can be liberated by a hydrocarbon-steam reforming reaction and the hydrogen subsequently reacted at the fuel cell anode. The paper describes the electrode processes involved in each of these alternatives and discusses the hydrocarbon-air fuel cell system which is now possible based on the recent achievements from U. S. Army research investigations. (Author)

MLM-1297 **Field 10B, 18B**
CFSTI Prices: HC$1.00 MF$0.50
Mound Lab., Miamisburg, Ohio.
RADIOISOTOPES FOR HEAT SOURCES. II. CALCULATIONS FOR PREPARATION OF 227 AC BY NEUTRON IRRADIATION OF 226 RA,
by K. W. Foster. 1 Jul 65, 11p
Contract AT (33-1)-GEN-53

Descriptors: (*Radioactive isotopes, Actinium), (*Actinium, Gamma rays).

For abstract, see T 66 15.

AD-634 315 **See Field 6K**

10C. ENERGY STORAGE

AD-634 388 **Field 10C, 9C**
CFSTI Prices: HC$1.00 MF$0.50
Naval Research Lab., Washington, D. C.
THE APPLICATION OF TOROIDAL GEOMETRY TO HIGH ENERGY STORAGE INDUCTORS.
Memo. rept.,
by D. S. Toffolo. Apr 66, 13p NRL-MR-1702

Descriptors: (*Coils, Geometric forms), (*Capacitors, Geometric forms), (*Superconductors, Coils), Solenoids, Circuits, Economics, Integrals.

The equations applicable to toroidal geometry for the design of magnetic energy storage toroids are derived. The energy storage density using superconducting material is considerably better and more economical than capacitative energy storage. (Author)

AD-634 491 **Field 10C**
CFSTI Prices: HC$4.00 MF$0.75
Electric Storage Battery Co., Yardley, Pa.
HIGH ENERGY SYSTEM (ORGANIC ELECTROLYTE).
Quarterly rept. no. 3, 15 Dec 65-15 Mar 66,
by D. P. Boden, H. R. Buhner, and V. J. Spera.
Jun 66, 102p
Contract DA-28-043-AMC-1394 (E)
Proj. DA-1C6-22001-A-053
Task 1C6-22001-A-053-02
ECOM-01394-3
See also AD-630 691.

Descriptors: (*Batteries + components, Organic materials), (*Wet cells, Organic materials), (*Electrolytes, Organic materials), Solvents, Pentanones, Acetates, Ethanols, Carbonates, Solutes, Cathodes (Electrolytic cells), Corrosion, Solubility, Electrodes, Glass, Copper compounds, Fluorides, Performance (Engineering), Electrical properties, Concentration (Chemistry), Anodes (Electrolytic cells), Lithium, Storage, Battery separators, Asbestos, Containers, Polyethylene plastics.

Identifiers: Cupric fluoride, Lithium perchlorate, Propylene carbonate, Organic batteries.

The study of high energy density systems included: continued investigation of new electrolyte solvents; corrosion and solubility studies of cathode and anode materials in various electrolytes; a study of the reversibility of glass electrodes in nonaqueous electrolytes; continued efforts to optimize CuF2 cathode performance; a study of the effect of electrolyte concentration and discharge current density on cathode performance; lithium anode storage tests; evaluation of various separator materials; construction and testing of Li-CuF2 cells in lightweight polyethylene cases.

AD-634 626 **Field 10C**
CFSTI Prices: HC$1.00 MF$0.50
Army Electronics Command, Fort Monmouth, N. J. Inst. for Exploratory Research.
A RECHARGEABLE THIN-FILM SOLID-ELECTROLYTE BATTERY,
by J. N. Mrgudich, P. J. Bramhall, and C. M. Schwartz. Jun 66, 139
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 Jun 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Batteries + components, Films), (*Electrolytes, Solids), Silver, Platinum, Silver compounds, Iodides, Pellets, Voltage, Electric discharges, Life expectancy, Miniature electrical equipment, Printed circuits.

Identifiers: Silver iodide.

A working model was devised for a battery consisting of a silver-silver iodide-platinum array. The array is viewed as a solid-electrolyte concentration cell in which the internal driving force is the high concentration of silver in the silver anode (negative) tending to force positively-charged silver ions through the AgI (an 'electrolyte' for silver ions) to reach a balance with the low concentration of silver in the platinum cathode (positive). Charge compensation requires that this internal flow of positive ions be accompanied by an equivalent external flow of electrons. The pellet-type batteries appear to offer the following advantages: lower internal resistance, inherent stability, good shelf-life (especially at low drains), recharge capability, reasonably good output, rugged packaging, wider temperature range of operation, simple production procedures, excellent miniaturization potential, fairly low material cost in terms of cents/volt.

N66-14376 **Field 10C**
CFSTI Prices: HC$4.00 MF$1.00
Battelle Memorial Inst., Columbus, Ohio.
DEVELOPMENT OF LARGE-INTERNAL-SURFACE-AREA NICKEL-METAL PLAQUES.
Final rept. 18 Jun 64-30 Sep 65,
by C. L. Faust, G. R. Schaer, J. McCallum, and D. G. Trevethan. 30 Sep 65, 133p
Contract NAS3-6003
NASA-CR-54831

Descriptors: Battery, Control, Electroforming, Manufacturing, *Nickel-cadmium battery, Porosity, Screen, Sintering, Cadmium, *Electrode, Impregnation, Nickel, Plate, *Porous plate, Shape, Stack.

For abstract, see T 66 15.

AD-634 298 **See Field 7D**

11A. ADHESIVES AND SEALS

AD-450 631 **See Field 8M**

AD-634 617 **See Field 7C**

11B. CERAMICS, REFRACTORIES, AND GLASSES

AD-634 524 **Field 11B, 20L, 9A**
CFSTI Prices: HC$4.00 MF$1.00
Sperry Microwave Electronics Co., Clearwater, Fla.
INVESTIGATION OF LARGE SIGNAL MICROWAVE EFFECTS IN FERROELECTRIC MATERIALS.
Final rept., 1 Jul 63-31 Jan 66,
by J. B. Horton, and M. R. Donaldson. Mar 66, 133p SJ-220-0048-9
Contract DA-36-039-AMC-03240 (E)
Proj. DA-1G6-22001-A-055-04
See also AD-602 508.

Descriptors: (*Ferroelectric materials, Titanates), (*Titanates, Electrical properties), (*Ceramic materials, Microwave equipment), Ferroelectric crystals, Dielectrics, Barium compounds, Dielectric properties, Limiters, Strontium compounds, Sulfates, Glycines, Nickel compounds, Lead compounds, Microwave frequency, Single crystals, Wave transmission.

Theory and measurement techniques for obtaining the dielectric constant and loss tangent for ferroelectric materials at microwave frequencies, and the experimental results using these techniques are included. Results of investigations of methods for processing ceramic (polycrystalline) materials for use at microwave frequencies are reported. Methods of investigating the nonlinear properties of ferroelectric materials biased in the paraelectric region are described, and results obtained using these methods are included. General application of ferroelectric materials for microwave components is discussed; results of the design and evaluation of a 1 GHz passive power limiter are reported. (Author)

AD-634 733 **Field 11B**
CFSTI Prices: HC$3.00 MF$0.75
Honeywell Research Center, Hopkins, Minn.
DEFORMATION AND FRACTURE OF IONIC SOLIDS.
Final rept.,
by Robert J. Stokes. May 66, 60p
Contract Nonr-4076 (00)
Proj. NR-032-451

Descriptors: (*Ceramic materials, Mechanical properties), (*Crystals, Mechanical properties), Crystal lattice defects, Deformation, Fraction (Mechanics), Plasticity, Brittleness, Ductility, Creep.

This summarizes the nature of point, line and surface defects in ceramics. The interactions between these defects and their role in the various modes of mechanical deformation are then reviewed. The paper examines anelastic effects, plastic yielding, brittle and ductile fracture and creep in single crystal and polycrystalline ceramics. Emphasis is on the behavior of ideal, well characterized materials of high purity and zero porosity with the intent of presenting the fundamental background to the subject. (Author)

ANL-7176 **Field 11B, 11F, 18I**
CFSTI Prices: HC$4.00 MF$0.75
Argonne National Lab., Ill.
REACTOR DEVELOPMENT PROGRAM PROGRESS REPORT, February 1966.
23 Mar 66, 101p
Contract W-31-109-eng-38

Descriptors: (*Nuclear reactors, Engineering).

For abstract, see N 20 13.

AD-450 625 See Field 18F

AD-451 322 See Field 11D

AD-458 541 See Field 20L

AD-474 285 See Field 17I

AD-634 135 See Field 7D

AD-634 354 See Field 13H

AD-634 361 See Field 13H

AD-634 528 See Field 20L

GEMP-55A See Field 18J

PB-169 497 See Field 13C

TID-21673 See Field 18J

TID-22424 See Field 11F

WAPD-TM-455 See Field 18J

11C. COATINGS, COLORANTS, AND FINISHES

AD-470 146 Field 11C, 7C, 11I
CFSTI Prices: HC$3.60 MF$0.50
Naval Air Engineering Center, Philadelphia, Pa. Aeronautical Materials Lab.
ADVANCED POLYMER RESEARCH TO DEVELOP POLYMERS FOR USE IN COATINGS EXPOSED TO EXTREME ENVIRONMENTS.
Progress rept. no. 3, 15 Dec 64-15 Jun 65. 15 Jun 65, 35p
Proj. NAEC-AML929)-R360FR101

Descriptors: (*Aircraft finishes, Polymers), (*Plastic coatings, Preparation), (*Phenyl ethers, Polymerization), Heat-resistant materials, Paints, Phenolic plastics, Polymerization, Molecular weight, Polyester plastics, Crosslinking (Chemistry), Halogenated hydrocarbons, Fluorine compounds, Acetones.

Identifiers: Bisphencls, Hexafluoro acetone.

Polymer synthesis was concentrated primarily on aromatic type structures for outstanding heat resistance, and more particularly with Bisphenol A type polyphenyl ester polymers. Further improvements in the interfacial polymerization process resulted in a reduction of polymerization cycles from 3 hours to 15 minutes. Also, molecular weights of polymers were increased, resulting in a marked improvement of elongation and of resistance to crazing, both of which are very necessary in a good coating polymer. Relative to Bisphenol A type polyphenyl ester coating polymers, a breakthrough was obtained in high temperature performance, from 500F to 750F, by thermal cross-linking. In practice, this reaction should occur naturally during aircraft operation at higher speeds, as skin temperature increase. New high molecular weight Fluoro-Bisphenol A (Hexafluoroacetone Bisphenol A) polyphenyl ester polymers were developed which exhibit greatly improved resistance to discoloration at elevated temperature. (Author)

AD-473 571 Field 11C, 16D, 16A
CFSTI Prices: HC$3.60 MF$0.50
Coating and Chemical Lab., Aberdeen Proving Ground, Md.
DEVELOPMENT OF AN OLIVE DRAB SOLAR HEAT REFLECTING AND LOW VISIBILITY ENAMEL.
Final rept.
by Melvin H. Sandler. 4 Oct 64. 35p CCL-188
Proj. DA-1C034401A329

Descriptors: (*Paints, Tests), Solar radiation, Reflection, Visibility, Costs, Preparation, Colors, Guided missiles, Ground support equipment, Camouflage.

The report covers the development of an olive drab solar heat reflectant and low visibility enamel for use on missiles and related ground support equipment such as instrument trailers and vans. This enamel, provides higher solar heat reflectance than any other dark shade enamels, is relatively inexpensive in cost and is olive drab color. (Author)

AD-634 138 Field 11C
CFSTI Prices: HC$0.50 MF$0.50
Coating and Chemical Lab., Aberdeen Proving Ground, Md.
ANALYSIS OF PETROLEUM SOLVENTS BY GAS CHROMATOGRAPHY. PART II. DETERMINATION OF AROMATIC SOLVENTS IN PETROLEUM PAINT THINNERS.
Analytical Procedure Development,
by George G. Esposito. May 66, 18p CCL-200-Pt-2
Proj. DA-1C024401A329

Descriptors: (*Polyester plastics, Paint thinners), (*Paint thinners, Organic solvents), (*Organic solvents, Solubility), Chemical analysis, Petroleum, Aromatic compounds, Gas chromatography, Chromatographic analysis, Benzenes.

Identifiers: Gas-liquid chromatography.

The solvency characteristics of petroleum thinners for alkyd resins can be related to the amount of aromatic hydrocarbons present. Many other synthetic resins require thinners of high aromatic content and there is a need for a rapid, accurate analytical method that can be used for quality control. The report describes a procedure for the determination of aromatic solvents in petroleum thinners by gas-liquid chromatography (GLC) using a highly selective partitioning liquid. (Author)

AD-634 156 Field 11C, 11F
CFSTI Prices: HC$2.00 MF$0.75
Coating and Chemical Lab., Aberdeen Proving Ground, Md.
TROPICAL EXPOSURE OF FINISHING SYSTEMS FOR FERROUS METALS.
Progress rept.,
by Melvin H. Sandler. Mar 66, 70p CCL-197
Proj. 1C024401A329

Descriptors: (*Coatings, Corrosion inhibition), (*Iron alloys, Coatings), Tropical tests, Paints, Steel, Paint primers, Corrosion resistance, Plastic coatings, Phosphate coatings, Organic coatings, Effectiveness.

The report covers a study on the corrosion protection afforded to ferrous metal under tropical exposure conditions by 28 paint systems covered by Military Standard 171 Finishing of Wood and Metal Surfaces. Also included were 4 systems using an experimental epoxy primer and one with an experimental thermoset acrylic top coat. The coatings were applied over solvent cleaned stell, as well as metal pretreatments conforming to Types I, II, and III of Federal Specification TT-C-490 Cleaning Methods and Pretreatment of Ferrous Surfaces for Organic Coatings. Test specimens were exposed in the Panama Canal Zone at breakwater, open field and rain forest sites. Another set was exposed concurrently at Aberdeen Proving Gound. After 21 months exposure test data showed zinc phosphate conforming to TT-C-490 Type I to be the most effective pretreatment and that with the exception of control of corrosion in scribed areas at seacoast sites, many of the current finishing systems will provide a high degree of corrosion protection under various types of climatic exposure. The exact duration of this protection remains to be determined by additional long term exposure of the more effective systems. (Author)

AD-634 201 Field 11C, 11F
CFSTI Prices: HC$1.60 MF$0.50
Naval Civil Engineering Lab., Port Hueneme, Calif.
COATING STUDIES AT KWAJALEIN, KANEOHE, AND PORT HUENEME.
Technical rept.,
by C. V. Brouillette, and R. L. Alumbaugh. 20 Aug 62, 17p TR-R-197-Add
Proj. Y-R007-08-001

Descriptors: (*Corrosion inhibition, Coatings), (*Coatings, Environmental tests), Antifouling coatings, Tar, Plastic coatings, Epoxy plastics, Greases, Paints, Rubber coatings, Vinyl plastics, Halocarbon plastics, Metal coatings.

Data on twenty-nine coating systems were not reported in TR-197 (AD-288 797, PB-162 683) 'Coating Studies at Kwajalein, Kaneohe, and Port Hueneme' (July 1962) since nine systems were anti-fouling coatings not suited for atmospheric exposure; six systems were reported in TN-309 (PB-135 133); three systems became damaged prior to exposure; one system was a pre-ge grease; one system was not applied to atmospheric exposure test panels; and nine systems were exposed at Port Hueneme only. At Port Hueneme a Teflon emulsion coating (Emralon) lost adhesion from the undercoat in less than one year of exposure; a catalyzed epoxy coating had failed at the scribe mark after three years exposure. The remaining seven coatings have given excellent protection to steel test panels for periods of three to five years. (Author)

AD-634 402 Field 11C, 11F
CFSTI Prices: HC$2.00 MF$0.50
Metals and Controls, Inc., Attleboro, Mass.
STUDY OF DUCTILE COATINGS FOR THE OXIDATION PROTECTION OF COLUMBIUM AND MOLYBDENUM ALLOYS.
Final rept. 1 Mar 65-28 Feb 66,
by E. H. Girard, J. F. Clarke, and H. Breit. May 66, 45p
Contract NOw-65-0340-f
See also AD-619 286.

Descriptors: (*Niobium alloys, Coatings), (*Refractory metal alloys, *Coatings), (*Molybdenum alloys, Coatings), Corrosion inhibition, Ductility, Platinum alloys, Intermetallic compounds, Oxidation, Tungsten, Rhenium, Hafnium, Iridium, Silicon compounds, Carbides, Aluminum compounds, Zirconium compounds, Magnesium compounds, Oxides, Cladding, Protective treatments, Diffusion.

Identifiers: Niobium alloy FS-85, Molybdenum alloy TZM.

Nine materials were examined as potential barriers to the degrading diffusion of elements from FS-85 and TZM substrate through platinum coatings. One metal, hafnium, and one binary combination, iridium clad tungsten, were particularly effective as diffusion barriers. However, the increase in coating life produced through usage of these metals was no more than would be expected with a similar increase in coating thickness. Coating lives of up to 66 hours were obtained at 2550F in flowing air. It appears that when formed under the proper conditions, platinum-molybdenum and platinum-columbium intermetallic compounds may act as barriers to coating-substrate interdiffusion. Their usefulness in extending coating life should be explored further. (Author)

AD-272 647 See Field 17H

AD-410 580 See Field 9E

AD-443 377 See Field 9E

AD-471 653 See Field 20F

AD-634 183 See Field 11F

AD-634 202 See Field 20A

AD-634 203 See Field 20A

AD-634 252 See Field 6H

AD-634 763 See Field 9A

PB-169 219 See Field 17H

11D. COMPOSITE MATERIALS

AD-451 322 Field 11D, 11I, 11B
CFSTI Price: HC$1.60
Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
EFFECT OF TEMPERATURE AND RATE OF LOADING ON THE TENSILE PROPERTIES OF GLASS-REINFORCED POLYESTER,
by Elsie McAbee, and Mitchel Chmura. Oct 64, 20p
Proj. DA-1A-024401A110
PA-TR-3156

Descriptors: (*Composite materials, Tensile properties), (*Polyester plastics, Composite materials), (*Glass textiles, Composite materials), Reinforcing materials, Loading (Mechanics), Temperature, Mechanical properties, Stresses, Strain (Mechanics), Failure (Mechanics), Modulus of elasticity, Deformation.

The results of an investigation of the effects of rates of loading and temperatures on the mechanical properties of glass-reinforced polyester are given. Standard tensile specimens were machined from sheets of glass-cloth-reinforced polyester in both the parallel and perpendicular directions. These specimens were subjected to tensile testing over a temperature range of -60C to +80C at both static and high rates. At room temperature (23C) and below, the stress-strain curves consisted of two straight portions connected by a knee. Above room temperature, a gradual curvature to failure was noted. With decrease in temperature and/or increase in rate, increases in strength, elongation, and work to produce failure were obtained. (Author)

AD-477 816 Field 11D
CFSTI Prices: HC$28.80 MF$1.50
Air Force Materials Lab., Wright-Patterson AFB, Ohio.
RESEARCH ON RESIN-IMPREGNATED, COLLIMATED BORON FILAMENTS AND IMPROVED HIGH-MODULUS, HIGH-STRENGTH FILAMENTS AND COMPOSITES,
by F. M. Wilson, and E. K. Lane. Dec 65, 292p
AFML-TR-65-382

Descriptors: (*Boron, Filaments), (*Filaments, Boron), (*Composite materials, Boron), Plastics, Impregnation, Tapes, Laminates, Processing, Etching, Finishes + finishing, Tensile properties, Flexural strength, Compressive properties.

The objective of the program was to maximize the portion of the basic strength in boron filaments which could be utilized in composite tape, NOL-rings, laminate panels, and test specimens therefrom. This objective was approached by comparative studies of the effectiveness of various etchants, finishes, resin systems, and processing variables. The latter processing variables were those involved in the conversion of reeled boron filaments supplied as Government-furnished property into collimated, preimpregnated multifilament tape and thence into press-laminate panels and NOL-rings from which test specimens were cut and evaluated. The tensile strength utilization of boron fibers in NOL-ring composites was increased 50% by an as-received fiber treatment consisting of nitric acid etching for 20 seconds at 248F followed by 2-second exposure to a nitrogen atmosphere at 1500F. Boron fiber reinforced bidirectional panel specimens using an Epon 828/1031 MNA/BDMA resin system had average composite strengths of 54 ksi, tensile; 86.7 ksi, flexural; and 149.2 ksi, compressive. The average moduli of these specimens were 20.5, tensile; 20.6, flexural; and 20.6, compressive. In general, only the tensile strength results are inferior to those of S-glass composites. It is recommended that higher-shear-strength, high-modulus resins, better finishes, and further improved fibers and processes be developed to correct this deficiency. (Author)

AD-634 604 Field 11D
CFSTI Prices: HC$3.00 MF$0.75
Monsanto Research Corp., St. Louis, Mo.
GLOSSARY TO THE SCIENCE OF COMPOSITES.
by Charlotte M. Bower, Micharl K. Collins, and John D. Calfee. 1966, 68p HPC-66-11
Contracts N00014-66-C-0045, ARPA Order-1001/58 (C-65-006)
Prepared in cooperation with Monsanto Co./Washington Univ., Joint ARPA Proj., St. Louis, Mo.

Descriptors: (*Composite materials, *Dictionaries), Handbooks.

The document contains a list of symbols and a compilation of the terminology indigenous to the field of composite materials. These terms are defined according to their common usage in the literature of the field. (Author)

AD-634 719 Field 11D, 9A, 13J
CFSTI Prices: HC$1.00 MF$0.50
Union Carbide Corp., Bound Brook, N. J. Plastics Div.
COMPOSITE THERMOPLASTIC/GLASS FILAMENT REINFORCEMENT FOR BUOYANT SUBMARINE CABLE.
Interim development rept., 10 Mar-10 Jun 66. 10 Jun 66, 10p
Contract NOO-140-66-C-0403

Descriptors: (*Glass textiles, Composite materials), (*Composite materials, Electric cables), (*Electric cables, Submarine antennas), Reinforcing materials, Buoyancy, Tensile properties, Wear resistance, Impregnation, Coatings.

The report describes the accomplishments for the development of two thermoplastic/glass reinforced electricla transmission lines. Covering the assembling of the equipment for impregnation of glass roving, and the evaluation of various glass - thermoplastic filaments. The experimental data to date show that: 1. Both 'E' and 'S' glass will give a theoretical strength, above the required 1200 lbs. for the insulated wire. (1800 and 2500 lbs. respectively). 2. Increasing coating percentage increases tensile strength, and abrasion resistance. 3. 'S' glass will be used to make insulated wire while E glass will be used as a screening media. 'E' glass is much less expensive and more readily available. (Author)

AD-466 458 See Field 21H

AD-474 285 See Field 17I

AD-634 205 See Field 11J

AD-634 216 See Field 1C

AD-634 308 See Field 11H

PB-169 497 See Field 13C

TID-22424 See Field 11F

11E. FIBERS AND TEXTILES

AD-405 433 Field 11E
CFSTI Price: HC$2.60
Southern Research Inst., Birmingham, Ala.
DETERIORATION OF FIBROUS MATERIALS BY ULTRAVIOLET LIGHT.
Annual rept. no. 3, 15 Dec 61-15 Dec 62,
by Charles V. Stephenson, William S. Wilcox, Henry T. Crenshaw, Hassel L. Hancock, and Edward B. Dismukes. Feb 63, 29p
Contract AF 33 (616)-7701
Proj. AF-7320
Task 73203
ASD-TDR-63-57
See also PB-162 439.

Descriptors: (*Fibers (Synthetic), Degradation), (*Ultraviolet radiation, Fibers (Synthetic)), Polymers, Tensile properties, Dacron, Organic nitrogen compounds, Thiazoles, Surfaces, Absorption, Hydrogen, Radiation damage, Benzimidazoles.

The report discusses primarily the effects of ultraviolet light on the tensile properties of four polymeric materials -- polyethylene terephthalate (Dacron), polybenzimidazole, a thiazole polymer, and a du Pont experimental material designated as HT-1. Among these materials, exceptions were found to the usual trend that degradation is more severe the shorter the wavelength of light. These exceptions are discussed in terms of an absorption of light near the surface of the material that, in effect, prevents the interior from being irradiated. Among materials studied, those that are known to contain hydrogen are more susceptible to irradiation damage in an oxygen atmosphere than in a nitrogen atmosphere or in a vacuum. (Author)

PB-169 452 Field 11E, 11I
CFSTI Prices: HC$2.60 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
SNATCH-TEARING OF FABRICS: APPARATUS, AND APPLICATION TO A LIGHT-WEIGHT FABRIC,
by J. E. Swallow, and E. Mikolajewski. Sep 65, 25p Technical rept. no. TR-65214

Descriptors: (*Parachute fabrics, Nylon), (*Textiles, Inflatable structures), (*Protective clothing, Aeronautical laboratories), Fibers (Synthetic), Penetration, Wear resistance, Tensile properties, Stresses.

Apparatus for tearing fabrics in a time of 0.05 sec is described. Energy is applied by means of a falling weight which impacts a nail of known diameter inserted in a biaxially (horizontally and vertically) tensioned fabric. The tearing of a light-weight nylon fabric has been studied in factorial experiments. Analysis of variance shows that the horizontal tension and energy input are the most important factors; the vertical tension and certain interactions are also significant. Results calculated from a fitted response surface give a correlation coefficient of 0.76 with experimental results.

AD-434 216 See Field 7E

11F. METALLURGY AND METALLOGRAPHY

AD-269 862 Field 11F
CFSTI Price: HC$3.60
Naval Research Lab., Washington, D. C.
ON EFFECTS OF CARBON AND MANGANESE CONTENT AND OF GRAIN SIZE ON DYNAMIC STRENGTH PROPERTIES OF MILD STEEL.
Final rept.,
by J. M. Krafft, and A. M. Sullivan. 27 Dec 61, 36p
Contract NOBs-84321
Proj. SR-142
Task 2004
SSC-139

Descriptors: (*Steel, Mechanical properties), Creep, Fracture (Mechanics), Stresses, Impact shock, Additives, Carbon, Manganese, Grain structure (Metallurgy).

The exceptionally low ductility of mild steel when separated by a rapidly moving crack may be attributed in part to its plastic flow strain-rate sensitivity. The elevation in yield strength under conditions of rapidly rising stress adjacent to the crack tip

suppresses formation of the energy-absorbing plastic zone. Variation in composition, particularly of C and Mn content which affect the notched bar impact transition temperature, should also affect strain-rate sensitivity if this description is applicable. The general trends in yield point strain-rate sensitivity are found in agreement with effects of composition on the Charpy transition temperature. A good correlation is found to exist between the parameter k, found from the grain size dependency of dynamic upper yield strength, and the transition temperature expectancy for given composition. Plastic flow stress, at given high strain rate, can be correlated with free path in ferrite better than with ferrite grain size. (Author)

AD-449 958 **Field 11F, 7D**
CFSTI Prices: HC$2.60
Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Chemistry.
THE THERMODYNAMICS OF CORROSION IN MOLTEN CARBONATES: APPLICATION OF E-pCO2 DIAGRAMS,
by Malcolm D. Ingram, and George J. Janz. Oct 64, 27p Technical rept. TR-23
Contract Nonr-591 (10)
Proj. RPI-441.35

Descriptors: (*Corrosion, Thermodynamics), (*Carbonates, Corrosion), Graphics, Oxidation-reduction reactions, Carbon dioxide, Metals, Oxides, Liquid metals, Electrochemistry, Lithium compounds, Sodium compounds, Potassium compounds.

Identifiers: Displacement series, Fused salts, Lithium carbonate, Potassium carbonate, Sodium carbonate.

The corrosion of metals in fused carbonates is discussed in terms of a diagrammatic presentation of the thermodynamic data. Diagrams are plotted of E versus pCO2, where E is the redox potential of the system, and pCO2 = -log (CO2). Each diagram is divided into three regions which mark the limits of stability at unit activity of the pure metal, metal oxide, and liquid metal carbonate. In the oxide region the metal may become passivated, but this depends on structural factors and requires experimental confirmation. The electrochemical series in molten carbonates is presented, and the significance of pCO2 in relation to acid-base behavior is discussed. (Author)

AD-467 523 **Field 11F**
CFSTI Prices: HC$5.60 MF$0.50
Mechanical Technology, Inc., Latham, N. Y.
THE EFFECT OF INELASTIC TENSILE PRESAIN ON THE BRITTLE FRACTURE PROPERTIES OF ANNEALED 4140 STEEL,
by D. W. McLaughlin. 6 May 65, 54p Technical rept. MTI-65TR21
Contract DA-44-009-AMC-723 (x)

Descriptors: (*Steel, Brittleness), (*Brittleness, Fracture (Mechanics)), Tensile properties, Strain (Mechanics), Heat treatment, Transition temperature, Ductility, Temperature, Tables, Experimental data.

For abstract, see T 66 15.

AD-634 128 **Field 11F, 20B**
CFSTI Prices: HC$2.00 MF$0.50
Franklin Inst. Research Labs., Philadelphia, Pa.
THE MICROSTRAIN REGION IN HIGH-PURITY REFRACTORY METALS.
Quarterly rept. no. 1, 1 Mar-31 May 66,
by H. L. Prekel, A. Lawley, and J. D. Meakin. 31 May 66, 32p Q-B2195-1
Contract Nonr-4434 (00)
See also AD-633 600.

Descriptors: (*Refractory metals, Zone melting), (*Zone melting, Molybdenum), (*Molybdenum, *Crystal lattice defects), Single crystals, Annealing, Metallic crystals, Strain (Mechanics), Impurities, Microstructure, Hysteresis, Controlled atmospheres.

Modifications to a conventional electron beam floating zone unit are described. The filament is hidden from the specimen and this results in increased stability of operation, longer filament life, and excellent uniformity of crystal diameter (0.130 in plus or minus 0.001 in). Molybdenum single crystals grown from vacuum arc-cast and hot swaged stock contain inclusions, and the crystals exhibit a high grown-in dislocation density about 6 x 10 to the 7th power/sq cm; 90% of these dislocations are associated with and are attributable to the inclusions. Variations in zoning speed, number of zone passes, and annealing treatments at 1700C in vacuum or in argon have no appreciable effect on the number of inclusions. The inclusions are effectively removed from zoned crystals by annealing in hydrogen at about 2000C; this is accompanied by a decrease in dislocation density to about 1,000,000/sq cm. Hydrogen annealing of the as-received material followed by zone melting gives inclusion-free crystals, and a dislocation density about 4,500,000/sq cm; a further hydrogen anneal after zone melting reduces the density to about 200,000/sq cm. Preliminary dislocation velocity experiments are described. The basic relations in mechanical hysteresis were reexamined. (Author)

AD-634 183 **Field 11F, 11C**
CFSTI Prices: HC$2.00 MF$0.50
Navy Marine Engineering Lab., Annapolis, Md.
THE BEHAVIOR OF SUPERALLOY OXIDE FILMS IN MOLTEN SALTS.
Research and development phase rept.,
by W. L. Wheatfall, H. Doering, and G. J. Danek Jr.Jul 66, 32p MEL-278/66
Task 3888

Descriptors: (*Nickel alloys, Corrosion), (*Films, Oxides), Corrosion-resistant alloys, Salts, Corrosive liquids, High-temperature research, Nickel compounds, Sodium compounds, Sulfates, Chlorides, Chromium compounds, Chromium alloys, Molybdenum alloys, Cobalt alloys, Aluminum alloys, Titanium alloys, Iron alloys, Nickel, Oxidation.

Identifiers: Inconel 713 C (Alloys), Udimet 500.

The effect of molten salts on the behavior at 1650 F of oxide films on two nickel-base superalloys and pure nickel was investigated. In the initial experiments, Na2SO4 and NaCl were reacted with Cr2O3 and NiO in both oxidizing and reducing atmospheres. Reactions occurred only under reducing conditions. Half-cell potential as a function or time was measured to study the effects of oxide thickness, electrolyte composition and atmosphere. A sustained rise in half-cell potential always accompanied sulfidation. In Alloy A (AMS 5391A) scale formation occurred at the metal-scale interface and Na2SO4 - 5 w/o NaCl was more corrosive than Na2SO4 alone. Sulfidation in Alloy B (AMS 5384) occurred only when NaCl was present. On both Alloys A and B the thicker the oxide film, the longer the elapsed time to a sustained rise in half-cell potential. (Author)

AD-634 211 **Field 11F, 13A**
CFSTI Prices: HC$2.00 MF$0.50
Navy Marine Engineering Lab., Annapolis, Md.
LITERATURE SURVEY OF CORROSION PREVENTION IN IDLE BOILERS.
Research and Development rept.,
by A. H. Wirsburger. Apr 66, 28p MEL-116/66
Proj. S-F020-02-02
Task 0613

Descriptors: (*Boilers, *Corrosion inhibition), Reviews, Corrosion, Additives, films, ILMS, Feed water.

A survey of the literature was conducted to gain insight into the possibility of finding a chemical additive that will prevent corrosion in idle boilers yet still allow them to be returned to operation without first requiring draining. The mechanisms of corrosion and the important factors which affect boiler corrosion are discussed. Corrosion inhibitors are classified by the mechanisms they employ for protection. Future work to be conducted is based upon the results of this survey. (Author)

AD-634 238 **Field 11F, 20L**
CFSTI Prices: HC$2.00 MF$0.50
Martin Co., Orlando, Fla. Materials Research Lab.
INTERPRETATION OF ELECTRON DIFFRACTION PATTERNS FROM THIN PLATELETS.
Technical rept.,
by H. M. Otte, W. L. Bell, and G. Thomas. Dec 65, 35p TR-15, OR-8327
Contract Nonr-3706 (00)
Prepared in cooperation with California Univ., Berkeley. Research supported in part by AEC.

Descriptors: (*Foils, *Electron diffraction analysis), (*Crystal lattice defects, Electron diffraction analysis), Grain structure (Metallurgy), Crystal lattices, Crystal structure, Electron microscopy.

Electron diffraction patterns from foils containing planar defects, e.g., precipitates or stacking faults, are considered in terms of relrods normal to the plane of the defect, and/or normal to the specimen surface. The patterns can be regarded as consisting of streaked reciprocal lattices superimposed on the matrix lattice. In the materials examined, faulting did not reproduce any detectable physical shift of allowed reflections. The observations indicate that faulting is regular rather than random. Stacking faults and HCP precipitates in FCC crystals can not as a rule be distinguished in the early stages of formation of the precipitate. A complete analysis of the spot pattern from foils containing planar defects generally requires an accurate determination of the crystal orientation. For this purpose Kikuchi patterns provide sufficient accuracy and an assessment of this is made. (Author)

AD-634 343 **Field 11F, 13H**
CFSTI Prices: HC$3.00 MF$0.75
Case Inst. of Tech., Cleveland, Ohio. Dept. of Metallurgy.
CONTROL OF CAST GRAIN SIZE OF STEEL CASTINGS; EFFECT OF GRAIN REFINEMENT ON PROPERTIES.
Interim rept., 16 Aug 64-30 Sep 65. 30 Sep 65, 81p
Contract DA-33-019-AMC-273 (Z)
Proj. DA-1-H-O-24401-A-111
ARMA-CR-64-04/2
See also AD-611 800.

Descriptors: (*Steel, Castings), (*Grain structures (Metallurgy), *Castings), Casting, Additives, Titanium, Brittleness, Melting, Vacuum apparatus, Tensile properties, Microstructure, Mechanical properties, Toughness, Carbides, Molding materials, Boron, Niobium, Vanadium, Zirconium, Chromium, Molybdenum.

Identifiers: Steel 4330.

Inoculation techniques were developed to refine the as cast structure of high strength steel. Titanium was found to be the most effective inoculant. Large titanium additions (0.6%) form sulfides which embrittle the steel. Small titanium additions (0.1%) together with controlled superheat and mold design may produce significant refinement. Under these conditions the structure of unidirectionally solidified castings was changed from columnar to equiaxed and the reduction in area increased by approximately 25% for specimens oriented vertically to the direction of heat flow and increased about 75% for horizontally oriented specimens. A small improvement in reduction in area of keel block castings was obtained by this method. Some improvement in toughness was also obtained by this grain refinement. The influence of vacuum melting on the cast structure of the same steel was investigated. A hypothesis explaining the mechanism of refinement by vacuum melting was proposed. (Author)

AD-634 384 Field 11F, 13H
CFSTI Prices: HC$3.00 MF$0.75
Nuclear Metals Div., Textron, Inc., West Concord, Mass.
STUDY OF DISPERSION-STRENGTHENED ALLOYS PRODUCED BY SLIS TECHNIQUES.
Final rept.,
by A. R. Kaufmann, W. C. Muller, and R. B. Russell. 1 Jun 66, 88p NMI-8002.4
Contract NOw-65-0386-f

Descriptors: (*Nickel alloys, Dispersion hardening), Microstructure, Solid solutions, Gadolinium alloys, Magnesium alloys, Uranium alloys, Lanthanium, Solubility, Erbium, Intermetallic compounds, Particle size, Rare earth compounds, Stability.

Identifiers: SLIS (Materials).

Alloys of nickel with Mg, U, Y, La, Gd, and Er were prepared by splatcooling and the growth rates of the precipitates were determined at various temperatures. In all cases the growth appears to be determined by a diffusion-controlled process. A qualitative correlation of decreasing growth rate with increasing melting point of the intermetallic compound was obtained for the Mg, U, and Y alloys, but this interpretation is not clear cut. The maximum solid solubilities of La, Gd, and Er in Ni are less than 150 ppm, but exact values could not be obtained. The compounds formed by La and Er have outstanding particle size stability at temperatures up to 1150C. This behavior must be at least partly attributable to the low solid solubility. The stability of the nickel-rare earth compounds is comparable to that of A12O3 in nickel. (Author)

AD-634 518 Field 11F
CFSTI Prices: HC$2.00 MF$0.50
Aerospace Research Labs., Office of Aerospace Research, Wright-Patterson AFB, Ohio.
THE EFFECTS OF INTERSTITIAL SOLUTE ELEMENTS ON THE FATIGUE LIMIT BEHAVIOR OF TITANIUM.
Final rept. Feb 57-Feb 66,
by H. A. Lipsitt, J. A. Roberson, and D. Y. Wang. Mar 66, 52p ARL-66-0052
Proj. AF-7021

Descriptors: (*Titanium, *Fatigue (Mechanics)), Impurities, Titanium alloys, Carbon alloys, Nitrogen, Oxygen, Temperature, Failure (Mechanics), Aging (Materials), Deformation.

Identifiers: Strain aging.

The fatigue behavior of titanium and three titanium-interstitial alloys, each containing about 1/4% of C, N, or O, has been investigated through the temperature range of 70F to + 500F and at liquid nitrogen temperature. The fatigue limit stress was found to vary with temperature in a more or less consistent fashion depending on the interstitial type and total interstitial content. The position of the fatigue limit knee does not vary in a consistent fashion with temperature, since the rate of strain aging, the process which is believed to be responsible for the fatigue limit, depends both on the temperature and the type of interstitial involved. It was found that the small amounts of the interstitials listed above cause marked changes in the fatigue limit stress. The effect of carbon seems to be the most pronounced insofar as strain aging is concerned, but the nitrogen alloy was far stronger at every temperature investigated. (Author)

AD-634 607 Field 11F
CFSTI Prices: HC$1.00 MF$0.50
Mechanical Properties Data Center, Traverse City, Mich.
NICKEL AND CHROMIUM BASE ALLOYS.
May 66, 11p IR-625

Descriptors: (*Nickel alloys, Mechanical properties), (*Chromium alloys, Mechanical properties), Data storage system, Information retrieval.

This is the seventh of a series of reports designed to acquaint the aerospace industries with the content and use of the Mechanical Properties Data Center. Since the total system content is too large to conveniently display under one cover, this report deals only with data in storage as of this date on nickel and chromium base alloys.

AD-634 665 Field 11F, 20M
CFSTI Prices: HC$1.00 MF$0.50
Army Missile Command, Redstone Arsenal, Ala.
DUCTILITY OF REFRACTORY METALS THROUGH THERMAL TECHNIQUES,
by Julian E. Bynum. Jun 66, 15p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Refractory metals, *Ductility), Tungsten, Molybdenum, Wire, Thermal analysis.

Commercially pure sintered and wrought tungsten and molybdenum wires, 0.030-inch in diameter, were used for this investigation. Considerable experimentation with the tungsten wires in an effort to achieve some measure of room-temperature ductility proved futile. These experiments were temporarily abandoned in favor of the studies on molybdenum. Molybdenum wires were heated to selected elevated temperatures in a vacuum of approximately 2 x 0.00001 torr in less than 1 minute, held at temperature for 20 minutes, and vacuum cooled to determine the temperature at which maximum ductility occurs on rapid heating. The results obtained led to the assumption that there is a certain temperature, or temperature range, below which molybdenum is ductile, regardless of heating rate or time at temperature, within reasonable limits.

AD-634 697 Field 11F
CFSTI Prices: HC$6.00 MF$1.25
Foreign Technology Div., Wright-Patterson AFB, Ohio.
INFLUENCE OF IMPURITIES AND RARE-EARTH ELEMENTS ON THE PROPERTIES OF ALLOYS,
by M. V. Pridantsev. 18 Feb 66, 231p FTD-MT-64-295
TT-66-61574
Edited machine trans. of mono. Vliyanie Primesi i Redkozemelnykh Elementov na Svoistva Splavov, Moscos, 1962 208p.

Descriptors: (*Alloys, Impurities), (*Steel, Impurities), Metallurgy, USSR, Rare earth elements, Alkali metals, Additives, Heat-resistant metals + alloys, Chromium alloys, Mechanical properties, Corrosion resistant alloys, Nickel alloys.

The translation considers the influence of certain fusible elements of impurities and additions of alkali earth and rare-earth elements on the technological, mechanical and auxiliary properties of high-alloy steels and alloys. Systematized data about properties of the indicated element-impurities and mechanism of their influence are listed. (Author)

AD-634 747 Field 11F, 13H, 13J
CFSTI Prices: HC$3.00 MF$0.75
Massachusetts Inst. of Tech., Cambridge. Welding Lab.
MECHANICAL AND METALLURGICAL BEHAVIOR OF RESTRAINED WELDS IN SUBMARINE STEELS.
Final rept.,
by Clyde M. Adams Jr, and D. A. Corrigan. May 66, 82p
Contract NObs-92077
Proj. SR007-01-01
Task 855

Descriptors: (*Steel, *Welds), (*Stresses, Steel), (*Submarine hulls, Welds), Maraging steels, Nickel alloys, Metal plates, Fracture (Mechanics), Stress relieving, Toughness.

Identifiers: Steel HY-130/150, Steel HY-80.

The study was made to develop a greater understanding of the thermomechanical aspects of the fusion welding process, particularly the dynamics of residual stress development and its significance in the cracking of HY - 130/150 steel. A method was developed by which the residual stress distribution in and near a weld can be completely and accurately determined. Weldment residual stresses can be obtained rapidly and economically using only standard strain measuring and machining techniques. Three different plate materials HY-130/150, HY-80, and 12% Ni maraging steels were studied. The nominal base metal yield strengths varied from 80,000 to 175,000 pounds per square inch. In HY-80 weldments the maximum residual stresses are longitudinal and of the order of the base metal yield strength. They were a maximum at the weld centerline. In HY130/150 and 12% Ni maraging steels, the maximum tensile stresses are again in the direction of welding. These maximum stress values occur, however, in the weld heat-affected-zone, far removed from the fusion line. Extremely high stress gradients were present in these regions. The observation that weldment residual stresses may be a maximum in regions other than the deposit has apparently not been reported before. An explanation of alloy-to-alloy differences based on the relative temperatures of hot plastic deformation and austenite transformation is proposed.

ANL-6568 Field 11F
CFSTI Prices: HC$3.00 MF$0.75
Argonne National Lab., Ill.
DIFFUSION IN GAMMA URANIUM.
Final rept.,
by N. L. Peterson, and S. J. Rothman. Nov 65, 92p
Contract W-31-109-eng-38

Descriptors: (*Uranium alloys, Diffusion), (*Gamma rays, Uranium alloys).

For abstract, see T 66 15.

BMI-1765 Field 11F, 18D, 18J, 7A
CFSTI Prices: HC$2.00 MF$0.50
Battelle Memorial Inst., Columbus, Ohio.
PROGRESS RELATING TO CIVILIAN APPLICATIONS DURING FEBRUARY 1966,
by Donald L. Keller. 1 Mar 66, 31p
Contract W-7405-eng-92

Descriptors: (*Reactor materials, State-of-the-art reviews).

For abstract, see N 20 13.

BNWL-190 Field 11F, 18J
CFSTI Prices: HC$2.00 MF$0.50
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
THE EFFECTS OF IRRADIATION AND ENVIRONMENT ON THE MECHANICAL PROPERTIES OF INCONEL-ZIRCALOY TRANSITION JOINTS,
by J. E. Irvin, and T. T. Claudson. Feb 66, 40p
Contract AT (45-1)-1830

Descriptors: (*Zirconium alloys, Radiation damage), (*Nickel alloys, Radiation damage).

For abstract, see N 20 13.

BNWL-202 Field 11F
CFSTI Prices: HC$1.00 MF$0.50
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.

IMPROVED POSTIRRADIATION TENSILE PROPERTIES OF HASTELLOY X-280,
by I. S. Levy, and K. R. Wheeler. Mar 66, 22p
Contract AT (45-1)-1830

Descriptors: (*Nickel alloys, Radiation damage).

Identifiers: Hastelloy X-280.

For abstract, see N 20 13.

BNWL-88 **Field 11F**
CFSTI Prices: HC$3.00 MF$0.75
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
EFFECTS OF FAST NEUTRON IRRADIATION, FABRICATION HISTORY, AND WATER OXYGEN ON THE ENVIRONMENTAL BEHAVIOR OF ZIRCONIUM ALLOYS,
by W. A. Burns. Feb 65, 88p
Contract AT (45-1)-1830

Descriptors: (*Zirconium alloys, Radiation damage), (*Radiation damage, Zirconium alloys).

For abstract, see N 20 13.

DP-996 **Field 11F, 18J**
CFSTI Prices: HC$2.00 MF$0.50
Du Pont De Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
ATTACHING RIBS TO ZIRCALOY FUEL ASSEMBLIES BY ELECTRON BEAM WELDING,
by Anthony S. Ferrara, and Forrest F. Glasgow. Feb 66, 23p
Contract AT (07-2)-1

Descriptors: (*Electron beam welding, Zirconium alloys), (*Zirconium alloys, Electron beam welding).

For abstract, see N 20 13.

NLCO-954 **Field 11F, 13J**
CFSTI Prices: HC$3.00 MF$0.75
National Lead Co. of Ohio, Cincinnati.
METALLOGRAPHY OF URANIUM PROCEDURES AND STANDARDS,
by M. H. Cornett. 25 Mar 66, 78p
Contract AT (30-1)-1156

Descriptors: (*Metallography, Standards), (*Uranium, Metallography).

N66-16380 **Field 11F**
CFSTI Prices: HC$2.00 MF$0.50
Case Inst. of Tech., Cleveland, Ohio. Dept. of Metallurgy.
EFFECTS OF HYDROSTATIC PRESSURE ON THE MECHANICAL BEHAVIOR OF BODY CENTERED CUBIC REFRACTORY METALS AND ALLOYS.
Interim technical rept. no. 3,
by S. V. Radcliffe. Dec 65, 28p
Grant NsG-654
NASA-CR-69857

Descriptors: *Formation, *Hydrostatics, *Iron alloy, *Mechanical property, *Tungsten alloy.

PB-169 085 **Field 11F**
CFSTI Prices: HC$3.00 MF$0.75
Massachusetts Inst. of Tech., Cambridge. Dept. of Metallurgy.
THE ATTACK OF COPPER-GOLD, SILVER-GOLD, COPPER-NICKEL, AND SILVER-COPPER ALLOYS BY SULFUR AT ELEVATED TEMPERATURES,
by Barry D. Lichter, and Carl Wagner. 1960, 62p
Contract DA-19-020-ORD-3661, Grant NSF-G1912

Descriptors: (*Corrosion, Sulfur), (*Silver alloys, Corrosion), (*Gold alloys, Corrosion), (*Copper alloys, Corrosion), (*Nickel alloys, Corrosion), High-temperature research, Sulfides, Corrosive gases, Corrosive liquids.

Cu-Au alloys involving 10 and 33 mole percent Au and Ag-Au alloys involving 12 mole percent Au are attacked by liquid or gaseous sulfur above 400C very rapidly with formation of a composite scale consisting of an outer homogeneous sulfide layer and an inner two-phase layer involving Au-rich alloy and sulfide in accord with theoretical considerations regarding the instability of a plane alloy-sulfide interface. The tendency to form a rugged alloy-sulfide interface decreases with higher Au contents especially at lower temperatures and the rate of attack by sulfur decreases accordingly. Ag-Cu alloys involving 40 mole percent Cu are also rapidly sulfidized at 400C and yield a single sulfide layer of uniform thickness. Cu-Ni alloys sulfidized at 400C yield a scale consisting of an outer layer which is supposedly digenite Cu1.8S, and an inner layer which is supposedly a solid solution of Cu2S in nickel sulfide. (Author)

RFP-647 **Field 11F, 20H**
CFSTI Prices: HC$1.00 MF$0.50
Rocky Flats Div., Dow Chemical Co., Golden, Colo.
VAPOR-DEPOSITED FILM DISTRIBUTION ON CURVED SUBSTRATE SURFACES,
by R. L. Beno. 1 Mar 66, 8p
Contract AT (29-1)-1106

Descriptors: (*Metal films, Surfaces), (*Vapor plating, Metal films).

TID-22424 **Field 11F, 11B, 20K, 11D**
CFSTI Prices: HC$2.00 MF$0.50
Federal Council for Science and Technology, Washington, D. C. Coordinating Committee on Materials Research and Development.
FEDERAL MATERIALS RESEARCH PROGRAM-OPPORTUNITIES, ROADBLOCKS AND PROBLEMS.
Nov 65, 33p

Descriptors: (*Heat-resistant materials, Composite materials), (*Reinforcing materials, Scientific research).

AD-433 559 See Field 13H

AD-465 025 See Field 13H

AD-634 140 See Field 13M

AD-634 141 See Field 13H

AD-634 156 See Field 11C

AD-634 192 See Field 13H

AD-634 201 See Field 11C

AD-634 260 See Field 13H

AD-634 268 See Field 20H

AD-634 336 See Field 13H

AD-634 345 See Field 20L

AD-634 402 See Field 11C

AD-634 477 See Field 10B

AD-634 532 See Field 13H

AD-634 571 See Field 13H

AD-634 585 See Field 13H

AD-634 669 See Field 13H

AD-634 687 See Field 13H

ANL-7094 See Field 18J

ANL-7176 See Field 11B

BMI-1754 See Field 18J

BNWL-113-12 See Field 7E

BNWL-113-13 See Field 7E

GEMP-55A See Field 18J

IS-1269 See Field 18J

LA-3443 See Field 18D

ORNL-3510 See Field 20M

PB-169 807 See Field 17B

PB-169 974 See Field 13J

PB-170 285 See Field 5C

PB-170 328 See Field 5C

RL-SEP-710 See Field 13H

RMI-4 See Field 18J

WAPD-MRP-114 See Field 18I

WAPD-TM-455 See Field 18J

WCAP-3385-5 See Field 18H

11H. OILS, LUBRICANTS, AND HYDRAULIC FLUIDS

AD-634 308 **Field 11H, 11D, 11**
CFSTI Prices: HC$3.00 MF$0.75
Department of the Navy, Washington, D. C.
TECHNOLOGY OF MANUFACTURE AND PROPERTIES OF ANTIFRICTION MATERIALS CONTAINING FLUOROPLASTICS: (BASIC PRINCIPLES OF PRODUCTION),
by A. P. Semenov, P. I. Matveevskii, and V. V. Pozdnyakov.1966, 61p Trans-2141
TT-66-61504
Trans. of mono. Tekhnologiya Izgotovleniya i Svoistva Soderyashchikh Ftoroplast Antifriktsionnykh Materialov (Osnovnye Printsypy Proizvodstva), Moscow, 1963.

Descriptors: (*Composite materials, *Lubricants), (*Halocarbon plastics, Lubricants), (*Bearings, Materials), Polymers, Friction, Physical properties, Mechanical properties, Plastic coatings, Production, Tapes, Steel, Bronze, Porous metals, USSR.

Identifiers: Polytetrafluoroethylene.

Contents: Comparative friction tests of various polymers with and without lubrication; Certain information on the physical, mechanical and technological properties of Fluoroplastic-4 (poly (tetrafluoro ethylene)); Possible means of utilizing the properties of Fluoroplastic-4 in developing antifriction materials and coatings; Survey of existing information on the use of Fluoroplastic-4 in antifriction materials; Possible industrial procedures for manufacturing combines of antifriction materials containing Fluoroplastic; Technological process of the manufacture of steel-porous bronze tape material impregnated with Fluoroplastic; Comparison tests of various materials containing Fluoroplastic; Conditions and possible fields of application of antifriction tape material containing poly (tetrafluoro ethylene).

AD-634 682 **Field 11H**
CFSTI Prices: HC$1.00 MF$0.50
Pitman-Dunn Research Labs., Frankford Arsenal, Philadelphia, Pa.
FRICTION STUDIES OF POLYMER SOLUTIONS,
by Henry Gisser, and Marco Petronio. Jun 66, 14p

Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Polymers, *Friction), (*Acrylic resins, Friction), (*Lubricant additives, Polymers), Vinyl plastics, Molecular structure, Polarization, Density.

A report is given of studies on the effects of polarity and length of side chains on the friction behavior of n-alkyl methacrylate polymers.

N66-15243 **Field 11H**
CFSTI Prices: K $2.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
FLUORIDE SOLID LUBRICANTS FOR EXTREME TEMPERATURES AND CORROSIVE ENVIRONMENTS,
by G. P. Allen, H. E. Sliney, and T. N. Strom.
1964, 37p NASA-TM-X-52077
Presented at the Ann. Meeting of the Am. Soc. of Lubrication Engr. (20th), Detroit, May 4-6 1965.

Descriptors: *Corrosion, *Fluoride, *High temperature environment, *Solid lubricant.

For abstract, see T 66 15.

PB-169 903 **Field 11H, 13I**
CFSTI Prices: HC$3.60 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
SELF-LUBRICATING BEARING MATERIALS,
by J. K. Lancaster. Sep 65, 34p Technical rept. TR-65213

Descriptors: (*Bearings, Materials), (*Lubrication, Bearings), (*Gears, Materials), Composite materials, Lubricants, Metals, Polymers, Carbon, Ceramic materials, Cermets, Powder metals, Porous materials, Impregnation, Graphite, Great Britain.

Identifiers: Self-lubricating materials.

A survey is given of progress in the development of self-lubricating materials for load-carrying components (bearings and gears) or for transfer lubrication (rolling element bearing retainers). Various methods for producing composites of inorganic solid lubricants, metals, polymers, carbons and ceramics are briefly described, and some suggestions for further work are included. (Author)

AD-634 292 **See Field 18H**

11I. PLASTICS

AD-463 880 **Field 11I**
CFSTI Price: HC$1.00
Frick Chemical Lab., Princeton Univ., N. J.
POLYIMIDES,
by Stuart Cooper, D. Mair, and A. V. Tobolsky.
May 65, 23p RLT-TR-86
Contract Nonr-1858 (07)
Proj. NR356-377

Descriptors: (*Plastics, Mechanical properties), (*Imides, Polymers), (*Polymers, Imides), Thermal stability, Decomposition, Pyrolysis, X-ray diffraction analysis, Films, Stresses, Strain (Mechanics).

Identifiers: Polyimides, H-film.

The mechanical properties of four different polyimide samples were compared. H-film, poly (N,N'-(p,p'-oxydiphenelene)pyromellitimide), shows no softening phenomena below 500C. The three other polyimides studied show a definite softening at elevated temperatures. All of the samples investigated show evidence of chemical reaction and eventual degradation taking place above 400C. X-ray photographs show H-film to be slightly crystalline. The other members of the polyimide group investigated reveal a typical amorphous scattering pattern. Factors such as the purity of starting materials and the problem of complete conversion to polyimide linkage must be considered when comparing the mechanical properties of these various polyimides. (Author)

AD-469 073 **Field 11I, 7D, 20L**
CFSTI Prices: HC$13.60 MF$1.00
California Univ., Los Angeles. Dept. of Chemistry.
GLASS TRANSITION IN POLYMERS,
by Mitchel C. Shen, and Adi Eisenberg. 1 Aug 65, 140p Technical rept. TR-9
Contract Nonr-233 (87)
Proj. NR-015-453

Descriptors: (*Polymers, Transformations), Glass, Transition temperature, Thermodynamics, Kinetics, Electromagnetic properties, Mechanical properties, Molecular properties, Pressure, Concentration (Chemistry), Molecular weight, Crosslinking (Chemistry), Reviews.

The review deals primarily with the glass transition in polymeric materials, although other materials are referred to when applicable. The presentation is divided into five parts: in the first the phenomenology of the glass transition is discussed. The second is devoted to several representative theoretical interpretations of the nature of these phenomena. The third section presents the molecular parameters affecting the glass transition, such as chain topology and intermolecular forces, and the fourth discusses the various controllable factors which influence the transition, among them hydrostatic pressure, diluent concentration, molecular weight, etc. Finally, the multiplicity of transitions in polymers are reviewed.

AD-634 234 **Field 11I, 7C**
CFSTI Prices: HC$2 00 MF$0.50
Plastics Technical Evaluation Center, Picatinny Arsenal, Dover, N. YJ
CROSSLINKING, THERMAL AND MECHANICAL PROPERTIES OF THERMOPLASTIC AND PHENOLIC RESIN SYSTEMS; A BIBLIOGRAPHY.
Rept. for 1960-1965,
by David W. Levi. Feb 66, 49p PLASTEC Note-11

Descriptors: (*Thermoplastics, Bibliographies), (*Phenolic plastics, Bibliographies), Crosslinking (Chemistry), Thermal properties, Mechanical properties, Abstracts.

An annotated bibliography of 184 items is reported on the crosslinking, thermal and mechanical properties of thermoplastic and phenolic resin systems. It is limited to the references in the author's personal file. However, these cover the significant journals in the field, for the years 1960-1965. Complete subject and author indexes are included for the convenience of the user. (Author)

AD-634 427 **Field 11I**
CFSTI Prices: HC$2.00 MF$0.50
Naval Research Lab., Washington, D. C.
INFRARED SPECTRA OF PLASTICS AND RESINS. PART 2 - MATERIALS DEVELOPED SINCE 1954,
by Suzanne S. Stimler, and R. E. Kagarise. 23 May 66, 37p NRL-6392
Proj. RR-001-01-43-4803

Descriptors: (*Infrared spectroscopy, *Plastics), Polymers, Density, Absorption spectrum, Spectra (Infrared).

Sixty-one polymeric materials, most of which have been developed since 1954, were studied. Infrared transmittance curves in the region from 4000 to 400/cm are presented for 46 of these. Curves for the 15 remaining ones are not shown, but are compared to those in each group that are identical or similar to them. Where possible, the spectra are discussed briefly in terms of the structural groups present. Methods based on infrared absorbance ratios are used to estimate the densities of some polyethylene polymers and some acrylonitrile-butadiene-styrene (ABS) terpolymers. In the case of polyethylene, these ratios can also be related to the crystalline content of the polymer. The procedure for identification of unknown spectra given in 'Infrared Spectra of Plastics and Resins,' Part 1, PB-111 438, is extended to include the newer polymeric materials. (Author)

BDX-613-70 **Field 11I, 11J**
CFSTI Prices: HC$1.00 MF$0.50
Bendix Corp., Kansas City, Mo.
A NEW DEVELOPMENT IN POLYURETHANE ELASTOMER PROCESSING WHICH REDUCES CRACK SUSCEPTIBILITY AND BUBBLE ENTRAPMENT,
by Donald D. Oswald. Apr 65, 23p CONF-650608-1
Contract AT (29-1)-613
Prepared for presentation at National Electronic Packaging and Production conference, Long Beach, Calif.

Descriptors: (*Isocyanate plastics, Processing), (*Elastomers, Stresses).

For abstract, see T 66 15.

AD-434 216 **See Field 7E**

AD-451 322 **See Field 11D**

AD-461 271 **See Field 20K**

AD-470 146 **See Field 11C**

AD-470 829 **See Field 7C**

AD-634 216 **See Field 1C**

AD-634 308 **See Field 11H**

AD-634 363 **See Field 7B**

AD-634 403 **See Field 13J**

AEC-TR-6520 **See Field 7E**

BDX-613-11 **See Field 18J**

PB-169 452 **See Field 11E**

PB-169 580 **See Field 11J**

PB-169 896 **See Field 7C**

Y-1508 **See Field 18J**

Y-1508 **See Field 18J**

11J. RUBBERS

AD-461 425 **Field 11J**
CFSTI Price: HC$2.60
Monsanto Research Corp., Everett, Mass. Boston Lab.
PHYSICAL AND RHEOLOGICAL PROPERTIES OF NITROSO RUBBERS.
Quarterly rept. no. 6, 25 Sep-24 Dec 64,
by G. L. Ball III, H. S. Wilson, I. O. Salyer, L. Gilman, and J. V. Pustinger. 14 Jan 65, 22p MRB4013Q6
Contract DA-19-129-AMC-151 (N)
Proj. MRC-4013 (4505)
See also AD-461-292.

Descriptors: (*Synthetic rubber, Physical properties), (*Organic nitrogen compounds, Polymers), (*Halogenated hydrocarbons, Polymers), Spectra (Infrared), Nuclear magnetic resonance, Chemical analysis, Viscosity, X-

ray diffraction analysis, Thermogravimetric analysis, Differential thermal analysis, Fluorine compounds, Shear stresses, Transition temperature.

Identifiers: Nitroso rubber.

Four nitroso gum samples were characterized by IR, NMR, elemental analysis, intrinsic viscosity, X-ray diffraction, TGA, DTA and Clash-Berg shear modulus. Infrared analyses indicated that the four gums were basically similar. NMR confirmed a previously reported structure of (-N(CF3)CF2CF2-O-)x. Elemental analysis, however, indicated a variation in fluorine content from 61 to 67%. Molecular weights by intrinsic viscosity were in the range of 1,000,000 to 1,300,000. TGA confirmed a previously disclosed weight loss at 75C with unzipping at 260C. DTA exhibited a mild exotherm at 250C. with an explosive exotherm at 295C. Glass transitions of -60C and -45C were found by means of the Clash-Berg shear modulus apparatus. However, it was felt that the -60C transition may be due in part to the presence of solvent. (Author)

AD-634 143 **Field 11J**
CFSTI Prices: HC$1.00 MF$0.50
Monsanto Research Corp., Dayton, Ohio.
PHYSICAL AND RHEOLOGICAL PROPERTIES OF NITROSO RUBBERS.
Quarterly rept. no. 10, 25 Sep-24 Dec 65,
by George L. Ball III, I. O. Salyer, and J. V. Pustinger. 12 Jan 66, 26p MRB-4013Q10
Contract DA-19-129-AMC-151 (N)
Proj. DA-4013 (4505)
See also AD-628 003.

Descriptors: (*Synthetic rubber, Physical properties), (*Organic nitrogen compounds, Polymers), (*Halogenated hydrocarbons, Polymers), Fluorine compounds, Methane, Ethylenes, Copolymerization, Chemical analysis, Solvents, Viscosity, Pyrolysis, Glass, Transition temperature, Differential thermal analysis, Impurities, Nuclear magnetic resonance.

Identifiers: Tetrafluoro ethylene, Trifluoro nitrosomethane.

Characterization of a trifluoronitrosomethane/tetrafluoroethylene copolymer was continued. The CF3NO/C2F4 copolymer was found to be adaptable to elution fractionation in a perfluorocyclic ether and a benzotrifluoride system, even though 85% of the polymer eluted in a narrow viscosity range of 1.3 to 2.0. Values of K and K' of the copolymer in FC-75 were confirmed to be 0.353 and 0.147, respectively. Thermal decomposition in air and in an inert gas was shown to be identical. The glass transition of the copolymer, as measured by DTA, is in the region of -41 C to -46C with no more than 2C difference between production lots. The white insoluble material present in the production lots was identified to be basic magnesium carbonate trihydrate. (Author)

AD-634 144 **Field 11J**
CFSTI Prices: HC$2.00 MF$0.50
Monsanto Research Corp., Dayton, Ohio.
PHYSICAL AND RHEOLOGICAL PROPERTIES OF NITROSO RUBBERS.
Quarterly rept. no. 11, 25 Dec 65-24 Mar 66,
by G. L. Ball III, and I. O. Salyer. 12 Apr 66, 35p MRB-4013-Q-11
Contract DA-19-129-AMC-151 (N)
Proj. DA-4013 (4505)
See also AD-628 003.

Descriptors: (*Synthetic rubber, Physical properties), (*Organic nitrogen compounds, Polymers), (*Halogenated hydrocarbons, Polymers), Copolymerization, Chemical analysis, Molecular weight, Agina (Materials), Deformation, Solvents, Rhecloly.

Identifiers: Nitroso rubber, Tetrafluoro ethylenes, Trifluoro nitrosomethanes.

Characterization of the trifluoronitrosomethane/tetrafluoroethylene copolymer was continued. The CF3NO/C2F4 copolymer was found to be adaptable to elution fractionation in a perfluorocyclic ether and a benzotrifluoride solvent/nonsolvent system. A weight-viscosity distribution consisting of 25 fractions was obtained. A sample from which 25% insoluble gel was removed exhibited two dominant molecular weight regions of 2 x 10 to the 5th power and 4 x 10 to the 6th power. The molecular weight of a fraction of the CF3NO/C2F4 copolymer with a reduced viscosity of 1.37 in perfluorocyclic ether was determined by light scattering to be 2.1 x 10 to the 6th power. An amine cured CF3NO/C2F4 sample was swollen by fourteen solvents and chemicals, including water. No crystallinity was observed in the CF3NO/C2F4 gum down to -80C. (Author)

AD-634 205 **Field 11J, 11D**
CFSTI Prices: HC$1.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
FILLER REINFORCEMENT IN SILICONE POLYMERS. PART I. THE EFFECT OF FINELY DIVIDED MATERIALS ON LIQUID POLYMERS.
Technical rept.,
by D. K. Thomas, and B. B. Moore. Feb 66, 22p TR-66061-Pt-1

Descriptors: (*Silicone plastics, Reinforcing materials), Great Britain, Polymers, Liquids, Viscosity, Magnesium compounds, Oxides, Silicon compounds, Dioxides, Carbon black, Particles, Particle size, Elastomers, Vulcanizates.

Identifiers: Fillers.

The effect of finely divided materials on a polydimethyl silicone oil was studied in the temperature range from 30 to 130C using a variable shear viscometer. The results are consistent with the view that fine powders become solvated on being dispersed in the oil; if a sufficient number of particles are present per unit volume of mixture and if the interactions between them are sufficiently large, aggregation can occur to give a micro-gel structure. Those materials which are highly reinforcing in silicone elastomers show evidence of micro-gel structure at volume concentrations below 4 per cent. For fillers of a given chemical type there are indications that the viscosity increment is dependent solely on mean particle size: there are further indications that carbon black is more effective in raising the viscosity than silica providing they are of comparable particle sizes. (Author)

AD-634 728 **Field 11J**
CFSTI Prices: HC$2.00 MF$0.50
Peninsular ChemResearch, Inc., Gainesville, Fla.
SYNTHESIS AND POLYMERIZATION OF FLUORINATED SULFUR MODIFIED NITROSO RUBBER.
Quarterly rept. no. 10, 26 Nov 65-26 Feb 66,
by Eugene C. Stump, Calvin D. Padgett, and Charles R. Wetzel. 26 Mar 66, 32p
Contract DA-19-129-AMC-152 (N)
USA-NLABS-66-52-CM
See also AD-469 354.

Descriptors: (*Synthetic rubber, Synthesis (Chemistry)), (*Organic nitrogen compounds, Polymers), (*Fluorine compounds, Synthetic rubber), Halogenated hydrocarbons, Polymerization, Bromine compounds, Crosslinking (Chemistry), Organic sulfur compounds.

Identifiers: Nitroso rubber.

Tetrafluoroallene was prepared and terpolymerized with CF3NO/CF2=CF2. Additional samples of methyl gamma-nitrosoperfluorobutyrate were prepared and polymerized with CF3NO/CF2=CF2. Several unsuccessful attempts were made to cross-link terpolymers containing CF2=CFBr, CF2=CFCF=CF2, C6F5NO, CF2=C =CF2 and CF2=CFCH=CH2. A low temperature polymerization unit was installed and is now in operation. (Author)

N66-14531 **Field 11J**
CFSTI Prices: HC$2.00 MF$0.50
Mellon Inst., Pittsburgh, Pa.
EFFECT OF CROSSLINK DENSITY ON THE CREEP BEHAVIOR OF NATURAL RUBBER VULCANIZATES,
by D. J. Plazek. 1965, 37p
Contract NSG-147-61
NASA-CR-69096
Presented at the Ann. Meeting of the Soc. of Rheology (36th), Cleveland, 25-27 Oct 1965.

Descriptors: *Creep analysis, *Cross linking, *Rubber, *Torsional stress, *Vulcanizate.

For abstract, see T 66 15.

PB-169 580 **Field 11J, 21I, 11**
CFSTI Price: HC$3.60
Thiokol Chemical Corp., Trenton, N. J.
IMPROVED POLYSULFIDE POLYMERS.
Quarterly progress rept. no. 4, 1 Nov 56-31 Jan 57,
8 Apr 57, 33p
Contract DA-19-129-QM-557
Proj. 7-93-15-004
AD132 203

Descriptors: (*Inorganic polymers, Sulfides), (*Sulfides, Inorganic polymers), Preparation, Polymerization, Halides, Sodium compounds, Surface-active substances, Silicone plastics, Elastomers, Solid rocket propellants.

Identifiers: Polysulfides.

Several variables were re-examined during the course of the investigation. The normal type of feed, i.e., addition of emulsified halide to sodium polysulfide, can be used under high speed agitation. A short study on the effect of heating cycle during polymerization produced no significant differences in polymer appearance or performance. Reaction sizes were increased to the point where two moles can be run; the yield is approximately 300 grams (75%) polymer. Reproducible polymers were obtained in the scale-up. Several emulsifying agents were investigated. Comparable polymer performances were obtained with the new emulsifying agents. The solvent resistance and low temperature characteristics of a 92/5/3 silicone-polysulfide polymer were checked. High speed stirring was used throughout the investigation. (Author)

AD-434 216 **See Field 7E**

BDX-613-70 **See Field 11I**

11K. SOLVENTS, CLEANERS, AND ABRASIVES

AD-438 940 **Field 11K**
CFSTI Price: HC$1.60
Coating and Chemical Lab., Aberdeen Proving Ground, Md.
THE USE OF SOFT DETERGENTS IN P-C-436b AND P-C-437 CLEANERS,
by A. Mankowich. 25 Mar 64, 16p CCL-162
Proj. DA-1-H-0-24401-A-110-05

Descriptors: (*Cleaning compounds, Effectiveness), (*Detergents, Effectiveness), Surfactants, Ethers, Phenylethers, Specifications.

Anticipating Federal Legislation banning the use of hard detergents, a feasibility study was made of the substitution of commercially-available, soft detergents in alkaline soak, hydrosteam, and high pressure steam cleaners of Federal Specifications P-C-436b and P-C-437. P-C-436b cleaners based on surfactant mixtures of an ethoxylated straight chain alkyl phenol or alcohol with a straight chain ABS met the specified performance requirements.

Soft ABS slurries (ca 50% liquid) were not suitable because they induced severe caking. Sodium lauryl sulphate and amphoterics of the quaternary imidazolium hydroxide and amino-carboxylate types, when used with soft nonionic ethoxylates, also gave satisfactory P-C-436b compounds. P-C-437 cleaners formulated with ethoxylated straight chain alcohols or alkyl phenol complied with the performance requirements of the specification. (Author)

AD-634 317 **Field 11K, 7D**
CFSTI Prices: HC$1.00 MF$0.50
Coating and Chemical Lab., Aberdeen Proving Ground, Md.
THE ENERGETICS OF SURFACTANT ADSORPTION AT THE AIR-WATER INTERFACE.
Progress rept.,
by A. Mankowich. May 66, 27p CCL-201
Proj. DA-1C024401A329

Descriptors: (*Surfactants, Adsorption), Air, Water, Surfaces, Thermodynamics, Enthalpy, Entropy, Ethylene oxide, Phenols, Complex compounds, Surface tension, Concentration (Chemistry), Alcohols, Ethers.

Identifiers: Free energy, Micelles, Nonyl phenols.

The standard free energy, enthalpy, and entropy changes (G, H, and S, respectively) for the adsorption at the air-water interface of a commercial ethylene oxide (EO) adduct of straight chain nonylphenol from monomer solution at the critical micelle concentration (CMC) were calculated from surface tension-concentration data at 21-45C using the Gibbs equation, the standard free energy change equation G = -RT ln (interfacial monomer concentration/CMC), and the Gibbs-Helmholtz equation which gave H directly from the slope of the (G/T) vs (1/T) function. The CMC and surface tension at the CMC (gamma-CMC) decreased, and-G and molecular area increased slightly, with increasing temperature. The H and S values were positive, and appear explainable by the postulations applied to micellization. At ambient temperature (28C) an increase in the (EO) mol ratio of straight chain nonylphenol and C13 secondary alcohol ethoxylates resulted in increases of CMC, gamma-CMC, and molecular area, and slight decreases in -G. A comparison of the 9 (EO) mol ratio adducts of C13 straight chain primary and secondary alcohols showed that the CMC and molecular area of the secondary alcohol ethoxylate were larger, and the gamma-CMC and -G smaller, than the corresponding values of the primary alcohol ethoxylate. (Author)

AD-634 425 **Field 11K**
CFSTI Prices: HC$1.00 MF$0.50
Naval Research Lab., Washington, D. C.
SOLUTION SYSTEMS FOR THE DISPLACING OF ORGANIC LIQUIDS FROM SOLID SURFACES,
by Marianne K. Bernett, and W. A. Zisman. 25 May 66, 13p NRL-6402
Projs. RR-001-01-43-4751, SR-007-08-04
Task 0617

Descriptors: (*Cleaning compounds, Solutions), (*Surface-active substances, Solutions), (*Organic solvents, Surfaces), Oils, Alkanes, Carbonates, Steel, Glass, Polymers, Hydrocarbons, Halogenated hydrocarbons, Siloxanes, Alcohols, Fatty acids.

Many liquid organic compounds that are effective in surface chemically displacing an adhering layer of a nonaqueous liquid from a solid surface are also effective when used in a solution in an appropriate nonaqueous solvent. Besides reducing the necessary quantity of active solute, the use of a solvent also greatly increases the variety of compounds effective in surface-chemical displacement by including compounds which are either solid (or very viscous) at ordinary temperatures. These principles were established by experiments on displacing hexadecane, propylene carbonate, and Navy Special Fuel Oil from the solid, clean surfaces of SAE 1020 steel, borosilicate glass, and a variety of polymeric organic solids used as insulating materials. Solvents used included common hydrocarbons, fluorinated hydrocarbons, or a combination of either. It was found that highly fluorinated alkanols and low-molecular-weight dimethyl silicones were especially well suited for temporary oil displacement when used in concentrations of only 0.05 to 5.0 wt-%. The duration of liquid displacement could be increased greatly by adding small concentrations (0.1 wt-%) of a compound capable of adsorbing from solution to form an oleophobic film on the solid surface; stearic acid and the higher molecular weight dimethyl silicones are good examples. Permanent oil-displacement from any type of surface was obtained by using concentrations as low as 0.02 wt-% of certain types of progressively fluorinated fatty acids. Applications of the solutions were equally effective whether they were by a dynamic means, such as by spraying or flushing, or by a combination of solution and subsequent competitive adsorption, such as by dipping or immersion. (Author)

AD-634 619 **Field 11K, 7C**
CFSTI Prices: HC$1.00 MF$0.50
Army Natick Labs., Mass.
BIODEGRADABLE DETERGENTS,
by Louis Long Jr, Claude H. Trottier, Morris R. Rogers, and Arthur M. Kaplan. Jun 66, 14p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Cleaning compounds, Degradation), (*Sulfonates, Cleaning compounds), (*Organic sulfur compounds, Cleaning compounds), Sodium compounds, Momecular isoerism, Oxidation, Bacteria, Synthesis (Chemistry), Benzenes.

Identifiers: Biodegradable detergents, Sodium (Sulfinyl dodecyl) benzene sulfonates, Sodium (Thia dodecyl) benzene sulfonates.

An attempt was made to improve the biodegradability of the straight-chain anionic detergents (LAS) by a novel approach involving the synthesis of the thia derivatives of sodium p- (n-dodecyl) benzenesulfonate in which the different methylene groups are successively replaced by sulfur. The eleven possible isomers of sodium p- (thia-n-dodecyl) benzenesulfonate, were synthesized for the first time. The sulfur atoms were also oxidized to sulfoxides, forming another series of compounds containing the sulfinyl group. This incorporation of a sulfur atom into the alkyl side-chain of the LAS molecule provided insight into the mechanism of its biodegradation and has resulted in the synthesis of new and more biodegradable detergents.

AD-634 776 **Field 11K, 15E**
CFSTI Prices: HC$1.00 MF$0.50
Coating and Chemical Lab., Aberdeen Proving Ground, Md.
STORAGE-STABILITY OF P-C-436b AND TT-R-230a, CLASS 2, MATERIAL.
Final rept.,
by A. Mankowich. Jun 66, 18p CCL-193
Proj. DA-1C024401A329

Descriptors: (*Cleaning compounds, *Storage), Paint removers, Stability, Specifications, Degradation, Mixtures.

A large scale, 12 months storage-stability study was made of representative compounds covered by Federal Specifications P-C-436b and TT-R-230a, Class 2. Three granulations of the former and two granulations of the latter material were investigated, ranging from 'commercial' grades (ca. 4% passing 100 mesh) to 'X' grades (ca. 29% passing 100 mesh) and a 'Y' grade (52% passing 100 mesh) for the P-C-436b compound (all granulations on a liquid surfactant-free basis). No caking was produced. (Author)

11L. WOOD AND PAPER PRODUCTS

PB-170 321 **See Field 5C**

12A. MATHEMATICS AND STATISTICS

AD-634 335 **Field 12A, 14D**
CFSTI Prices: HC$2.00 MF$0.50
Boeing Scientific Research Labs., Seattle, Wash. Mathematics Research Lab.
A MULTIVARIATE EXPONENTIAL DISTRIBUTION,
by Albert W. Marshall, and Ingram Olkin. Mar 66, 38p D1-82-0505, Mathematical note-450
Also available from the authors.

Descriptors: (*Statistical distributions, *Distribution theory), Multivariate analysis, Reliability, Life expectancy.

Identifiers: Exponential distribution.

A number of multivariate exponential distributions are known, but they have not been obtained by methods that shed light on their applicability. This paper presents some meaningful derivations of a multivariate exponential distribution that serve to indicate conditions under which the distribution is appropriate. Two of these derivations are based on 'shock models', and one is based on the requirement that residual life is independent of age. It is significant that the derivations all lead to the same distribution. For this distribution, the moment generating function is obtained, comparison is made with the case of independence, the distribution of the minimum is discussed, and various other properties are investigated. A multivariate gamma distribution is obtained by convolution, and a multivariate Weibull distribution is obtained through a change of variables. (Author)

AD-634 341 **Field 12A, 13H**
CFSTI Prices: HC$4.00 MF$1.00
Cornell Univ., Ithaca, N. Y. Dept. of Industrial Engineering and Operations Research.
OPTIMAL SEQUENTIAL PLANS BASED ON PRIOR DISTRIBUTIONS AND COSTS.
Technical rept.,
by Mainak Mazumdar. Apr 66, 148p TR-3
Contract Nonr-401 (53), Grant NSF-GP-3783
Projs. NR-042-244, RR-003-05-01

Descriptors: (*Sequential analysis, *Quality control), Optimization, Costs, Decision theory, Sampling, Model theory.

Identifiers: Theses, Bayes procedures.

A. Hald in Technometris, Vol. 2, No. 3 proposed a model of sampling inspection by attributes. He postulated certain definite forms for the losses which are associated with the acceptance or rejection of a lot, and for the cost of taking a single observation. He further assumed that there exists an a priori distribution of the number of defectives, the distribution being known to the experimenter. Under these assumptions he derived the associated single sampling plans which minimize the expected costs averaged with respect to the known a priori distribution. J. Pfanzagl in Technometrics, Vol. 5, No. 2 specialized Hald's model by considering a particular type of a priori distribution, and obtained the double sampling plans which are optimal in the same sense. In this paper, Pfanzagl's work has been generalized by extending his results to sequential plans. In particular, the related optimal (Bayes) sequential sampling plans and their operating characteristics are derived. The Bayes risks of the optimal sequential plans are compared with those of the corresponding optimal single sampling plans for certain representative values

of the parameters. The limiting behavior for large lots of the optimal boundaries for the sequential sampling plans is studied using a particular normalization due to Chernoff and Ray. (Annals of Math. Stat., Vol. 36, No. 5). (Author)

AD-634 342 **Field 12A, 13H**
CFSTI Prices: HC$4.00 MF$0.75
Cornell Univ., Ithaca, N. Y. Dept. of Industrial Engineering and Operations Research.
A COMPARISON OF THE PERFORMANCE CHARACTERISTICS OF TWO SEQUENTIAL PROCEDURES FOR RANKING MEANS OF NORMAL POPULATIONS.
Technical rept.,
by John S. Ramberg. May 66, 124p TR-4
Contract Nonr-401 (53), Grant NSF-G-22585
Projs. NR-042-244, RR-003-05-01

Descriptors: (*Sequential analysis, *Monte Carlo method), Selection, Decision theory, Sampling, Population (Mathematics).

Identifiers: Theses.

This paper reports on the results of a Monte Carlo study of the performance characteristics of three statistical procedures for selecting the normal population with the largest population mean, when the population variances are known and equal. The procedures are the Bechhofer-Kiefer-Sobel (open-ended) sequential procedure, the Paulson (closed) sequential procedure, and the Bechhofer single-stage procedure. Particular emphasis is given to the expected number of stages, and the expected total number of observations required to terminate experimentation for the sequential procedures. In addition to comparisons between procedures, the performance characteristics of the Paulson procedure (actually a family of procedures) are studied as a function of the parameter defining the family. (Author)

AD-634 352 **Field 12A, 14D**
CFSTI Prices: HC$4.00 MF$0.75
Michigan State Univ., East Lansing. Dept. of Statistics.
ASYMPTOTIC DISTRIBUTIONS IN SOME NON-REGULAR STATISTICAL PROBLEMS.
Technical rept.,
by B. L. S. Prakasa Rao. 10 Apr 66, 119p TR-9, MSU-RM-154
Contract Nonr-2587 (02)

Descriptors: (*Statistical distributions, *Stochastic processes), Reliability, Statistical functions, Failure (Mechanics).

For abstract, see T 66 15.

AD-634 364 **Field 12A, 20K**
CFSTI Prices: HC$3.00 MF$0.75
North Carolina State Univ., Raleigh. Applied Mathematics Research Group.
LECTURES ON MEHLER-FOCK TRANSFORMS AND SOME OF THEIR APPLICATIONS,
by Ian N. Sneddon. 20 Apr 66, 76p
Grant AF-AFOSR-444-64
Prepared in cooperation with Glasgow Univ. (Scotland).

Descriptors: (*Integral transforms, Theory), (*Boundary value problems, Integral transforms), (*Elasticity, Boundary value problems).

Identifiers: Lectures, Mehler-Fock transforms.

The notes are based upon the content of four lectures given at North Carolina State University in the spring of 1966 and may be regarded as a continuation of the notes issued in the two preceding years. Their aim is to provide basic results in the theory of Mehler-Fock transforms that can be used to study certain boundary value problems in the classical theory of elasticity.

AD-634 417 **Field 12A**
University of Southern California, Los Angeles. Dept. of Mathematics.
CONDITIONAL STABILITY AND DICHOTOMIES,
by H. A. Antosiewicz. 1965, 6p
Contract DA-31-124-ARO (D)-265
AROD-5075:5

Descriptors: (*Differential equations, Theory).

For abstract, see T 66 15.

AD-634 418 **Field 12A**
University of Southern California, Los Angeles. Dept. of Mathematics.
RECENT CONTRIBUTIONS TO LYAPUNOV'S SECOND METHOD,
by H. A. Antosiewicz. 1965, 6p
Contract DA-31-124-ARO (D)-265
AROD-5075:6

Descriptors: (*Differential equations, Theory).

Identifiers: Lyapunov method.

For abstract, see T 66 15.

AD-634 419 **Field 12A**
University of Southern California, Los Angeles. Dept. of Mathematics.
SOME PROBLEMS CONCERNING STABILITY IN THE LARGE,
by H. A. Antosiewicz. 1965, 5p
Contract DA-31-124-ARO (D)-265
AROD-5075:7

Descriptors: (*Differential equations, Theory).

For abstract, see T 66 15.

AD-634 559 **Field 12A**
CFSTI Prices: HC$2.00 MF$0.50
Maryland Univ., College Park. Inst. for Fluid Dynamics and Applied Mathematics.
ANALYTIC REPRESENTATION OF GENERALIZED FUNCTIONS.
Technical note,
by John J. Benedetto. May 66, 34p BN-450
Contract Nonr-595 (17)

Descriptors: (*Functions, *Distribution theory), Integral transforms, Complex variables.

For abstract, see T 66 15.

AD-634 734 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
Washington Univ., Seattle. Dept. of Mathematics.
CONJUGACY CLASSES IN LIE ALGEBRAS AND ALGEBRAIC GROUPS.
Technical rept.,
by R. W. Richardson Jr. Jun 66, 22p TR-29
Contract Nonr-477 (15)
Proj. NR-043-186

Descriptors: (*Algebras, *Groups (Mathematics)), Algebraic geometry.

Kostant has shown that a complex semi-simple Lie algebra has only a finite number of nilpotent conjugacy classes. This paper shows how Kostant's theorem can be obtained as a special case of an elementary theorem on conjugacy classes in reductive subgroups of algebrais subgroups. As a corollary of this theorem we show that a semi-simple algebrais group over an algebraically closed field of characteristic $p > 5$ has only a finite number of unipotent conjugacy classes. Related conjugacy theorems are proved for subalgebras and homomorphisms of Lie algebras. (Author)

AD-634 755 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
PARITY PATTERNS ON EVEN SEMIGRAPHS,
by Norman C. Dalkey. May 66, 5p P-3376
Prepared for publication in the Journal of Combinatorial Theory.

Descriptors: (*Combinatorial analysis, *Graphics), Theory.

For abstract, see T 66 15.

AD-634 768 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
Wisconsin Univ., Madison. Dept. of Statistics.
QUANTIFICATION OF OCKHAM'S RAZOR BY VIOLATION OF THE LIKELIHOOD PRINCIPLE.
Technical rept.,
by Mervyn Stone. Mar 66, 15p TR-66
Contract Nonr-1202 (17)
Proj. NR-042-222

Descriptors: (*Decision theory, Optimization), Curve fitting, Statistical analysis, Statistical tests.

Identifiers: Ockham's Razor.

For inference situations with an ancillary statistic, a quantifier, based on a significance level whose calculation involves the distribution of the ancillary statistic, is described which provides a quantification of Ockham's Razor. Its application is proposed for those cases where the method of maximum likelihood fails, due to 'overparametrization', or rather, inadequate experimentation. Examples described include (i) a curve fitting problem (ii) a problem involving the observable convolution of two individually unobservable binomial variables. (Author)

AD-634 769 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
Wisconsin Univ., Madison. Dept. of Statistics.
ON STATISTICALLY INSPIRED CONDITIONS FOR THE GROUP STRUCTURE OF INVARIANT EXPERIMENTS.
Technical rept.,
by Mervyn Stone. Apr 66, 24p TR-67
Contract Nonr-1202 (17)
Proj. NR-042-222

Descriptors: (*Experimental design, *Groups (Mathematics)), Measure theory, Invariance, Decision theory, Statistical distributions.

The paper examines, within the context of group theory, the close links between the condition of Haar controllability (which ensures that the quasi posterior distributions for a group invariant experiment with respect to right Haar measure as quasi prior obey a natural requirement) and similar conditions imposed in the same context (to ensure decision theoretically desirable properties of invariant procedures) by Peisakoff, Kudo, Kiefer and Hunt, Stein and Lehmann. A counter conjecture is given and a direct proof of a counter example to the possible vacuity of these conditions is established. Partial insight into the above links is established by further linkage with wide sense Bayes procedures. (Author)

AD-634 770 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
Wisconsin Univ., Madison. Dept. of Statistics.
THE USE OF PRIOR DISTRIBUTIONS IN THE DESIGN OF EXPERIMENTS FOR PARAMETER ESTIMATION IN NONLINEAR SITUATIONS.
Technical rept.,
by Norman R. Draper, and William G. Hunter-, Apr 66, 17p TR-68
Contract Nonr-1202 (17), Grant NSF-GP-2755
Proj. NR-042-222

Descriptors: (*Experimental design, *Statistical distributions), Distribution functions.

For abstract, see T 66 15.

AD-634 771 **Field 12A**
CFSTI Prices: HC$2.00 MF$0.50
Wisconsin Univ., Madison. Dept. of Statistics.
RESPONSE SURFACE DESIGNS FOR FACTORS AT TWO AND THREE LEVELS.
Technical rept.,
by Norman R. Draper, and David M. Stoneman.-
May 66, 35p TR-70
Contract Nonr-1202 (17)
Proj. NR-042-222

Descriptors: (*Experimental design, *Factor analysis), Polynomials.

The choice of an experimental design suitable for fitting a graduating polynomial can be made according to a number of criteria, depending on the problem involved. Difficulties arise when, although the factors are continuous in nature, the number of levels is specified by some external considerations. For example, if some factors can be examined at only two levels, the graduating function cannot include quadratic terms in those variables, but all second order terms for variables to be examined at three or more levels can be permitted. For such cases, a restricted model and special experimental designs are needed. This paper considers the problem when there are some factors at two levels and some factors at three levels. (Author)

AD-634 773 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
Wisconsin Univ., Madison. Dept. of Statistics.
RESPONSE SURFACE DESIGNS FOR FACTORS AT TWO AND FOUR LEVELS.
Technical rept.,
by Norman R. Draper, and David M. Stoneman.
May 66, 15p TR-73
Contract Nonr-1202 (17)
Proj. NR-042-222

Descriptors: (*Experimental design, *Factor analysis), Polynomials.

In a previous paper, AD-634 771, the authors considered the construction of response surface designs for situations where p factors could be examined at two levels and q factors could be examined at three levels. These designs consisted of portions of the corresponding 2 (p)3 (q) factorial designs. In this paper they extend the construction method to situations where p factors are at two, and q factors are at four levels.

AD-634 774 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
Wisconsin Univ., Madison. Dept. of Statistics.
GENERALIZED BAYES DECISION FUNCTIONS, ADMISSIBILITY AND THE EXPONENTIAL FAMILY.
Technical rept.,
by M. Stone. May 66, 12p TR-74
Contract Nonr-1202 (17)
Proj. NR-042-222

Descriptors: (*Statistical functions, *Decision theory), Measure theory.

Three types of generalized Bayes decision functions NGBDF, EGBDF, CGBDF are defined and their relationships examined. A sufficient condition is given for the admissibility of a CGBDF. In the context of the exponential family and quadratic loss estimation, a sufficient condition that x/lambda (+) be a CGBDF for the mean is shown to be the same as Karlin's condition for the admissibility of x/ (lambda +1). (Author)

ORNL-3920 **Field 12A, 18K**
CFSTI Prices: HC$2.00 MF$0.50
Oak Ridge National Lab., Tenn.
STOCHASTIC DIFFERENCE EQUATIONS OCCURING IN ONE-COMPARTMENT MODELS,
by V. R. Rao Uppuluri, P. I. Feder, and R. L. Shenton. Apr 66, 34p
Contract W-7405-eng-26
Prepared in cooperation with Stanford Univ., Calif. and Georgia Univ., Athens.

Descriptors: (*Models (Simulations), Radioactive isotopes), (*Difference equations, Stochastic processes).

For abstract, see T 66 15.

SLAC-58 **Field 12A, 20G, 20H**
CFSTI Prices: HC$1.00 MF$0.50
Stanford Linear Accelerator Center, Stanford Univ., Calif.
INFINITE LADDERS AND THE ALGEBRA OF INTEGRATED CURRENT COMPONENTS,
by H. Harari. Jan 66, 14p
Contract AT (04-31)-515

Descriptors: (*Elementary particles, Algebras), (*Operators (Mathematics), Nuclear physics).

UCRL-14546 **Field 12A, 20J**
CFSTI Prices: HC$1.00 MF$0.50
Lawrence Radiation Lab., Univ. of California, Livermore.
A NOTE ON PARALLELISM,
by M. Neuman. 22 Nov 65, 22p
Contract W-7405-eng-48

Descriptors: (*Quantum mechanics, Mapping (Transformations)), (*Changed particles, Transformations (Mathematics)).

AD-273 112 **See Field 15B**

AD-422 500 **See Field 20J**

AD-469 995 **See Field 8C**

AD-634 148 **See Field 5A**

AD-634 199 **See Field 5C**

AD-634 257 **See Field 20J**

AD-634 283 **See Field 6D**

AD-634 294 **See Field 6D**

AD-634 306 **See Field 6M**

AD-634 599 **See Field 15G**

AD-634 698 **See Field 5C**

AD-634 713 **See Field 20D**

ANL-6987 **See Field 9B**

LA-3364 **See Field 20M**

LA-3407 **See Field 9B**

LA-3437 **See Field 18A**

NAA-SR-11530 **See Field 18K**

PB-169 910 **See Field 7D**

SCL-DC-65-112 **See Field 18D**

UCRL-14702 **See Field 18H**

WCAP-6073 **See Field 18I**

12B. OPERATIONS RESEARCH

AD-634 197 **Field 12B**
CFSTI Prices: HC$1.60 MF$0.50
Rand Corp., Santa Monica, Calif.
VARIATIONAL PROBLEMS WITH INEQUALITY CONSTRAINTS.
Revised ed.,
by Stuart Dreyfus. 26 Feb 62, 20p P-2357
Revision of report dated 17 Jul 1961.

Descriptors: (*Calculus of variations, Optimization), Dynamic programming, Partial differential equations, Numerical analysis, Inequalities.

Identifiers: Mayer problem.

For abstract, see T 66 15.

AD-634 239 **Field 12B, 13B**
CFSTI Prices: HC$2.00 MF$0.50
Carnegie Inst. of Tech., Pittsburgh, Pa. Graduate School of Industrial Administration.
SIMULATION, OPTIMIZATION AND EVALUATION OF SYSTEMS OF TRAFFIC NETWORKS.
Management sciences research rept.,
by W. W. Cooper, and A. Charnes. 31 May 66, 44p MSRR-77
Contract Nonr-760 (24)
Proj. NR-047-048
Prepared in cooperation with Northwestern Univ., Evanston, Ill. Systems Research Group. Contracts Nonr-1228 (10), Proj. NR-047-021, DA-31-124-ARO (D)-322, Rept. no. Systems Research memo-154.

Descriptors: (*Operations research, *Traffic), (*Linear programming, Transportation), Systems engineering, Simulation, Optimization, Game theory.

A sequence of linear programming models of network type are here used to illustrate how the optimizations of linear programming may be used to provide guidance and control (a) for simulating complex nonlinear systems and (b) for evaluating possible alterations in system designs. This is first illustrated by an example involving only a single extremization (optimization). Subsequently this is extended to a polyextremization which utilizes certain concepts from the theory of n-person nonzero sum games. The latter is then replaced by a model which again utilizes only a single extremal principle which is related to linear programming by means of what are called multi-copy network models. This is used to accommodate multiple origin-to-destination requirements in which two-way flow on the links is possible. Possible extensions and use of these ideas are examined, including ways in which zoning and traffic studies might be combined for joint treatment. Routes for further research are also suggested. (Author)

AD-634 272 **Field 12B, 9C**
CFSTI Prices: HC$3.00 MF$0.75
Illinois Univ., Urbana. Coordinated Science Lab.
ALGEBRAIC GENERATION AND ACTIVE NETWORK REALIZATION OF STATE EQUATIONS,
by G. O. Martens. May 66, 63p R-294
Contract DA-28-043-AMC-00073 (E), Grant SF-GK-36

Descriptors: (*Electrical networks, *Matrix algebra), Input-output devices, Equations of state, Synthesis, Dynamics.

A characterization is given for the state equations of an RLC network with sources. It is shown that the coefficient matrix of the state equations must be representable as a product of two factors satisfying necessary symmetry conditions. Each factor must be realizable as the input-output matrix of a resistive network. It is also shown that, except for degenerate cases, an input-output matrix singular as well as non-singular must satisfy a divisibility property. The divisibility property is then utilized to insert variables to generate a near-primitive hybrid matrix from an input-output matrix. This process is algebraic and does not require the factoring of polynomials. The near-primitive hybrid matrix determines a positive definite diagonal matrix and a hybrid matrix which, after the permutation of submatrices, yield the required product representation for the coefficient matrix of the state equations. The characteristic polynomial of the A matrix is identical with the minimal polynomial of A and the monic common denominator of the input-output matrix. Active RC and active RLC network realizations for time-varying as well as

time-invariant linear state equations are obtained. Thus it is shown that any linear system, time-varying or time-invariant, can be simulated by an active network. (Author)

AD-634 309 **Field 12B, 9C**
CFSTI Prices: HC$3.00 MF$0.50
Illinois Univ., Urbana. Coordinated Science Lab.
THE ABSOLUTE STABILITY OF SYSTEMS WITH MULTIPLE NONLINEARITIES.
Doctoral thesis,
by Michael S. Davies. May 66, 56p R-288
Contract DA-28-043-AMC-00073 (E), Grant AF-AFOSR-931-65
Proj. DA-20014501B31F

Descriptors: (*Control systems, Stability), Nonlinear systems, Time-lag theory, Matrix algebra, Integral transforms, Dynamics.

Identifiers: Theses.

Popov's criterion for the absolute stability of nonlinear systems is generalized to include a class of multivariable systems. Both the linear plant and the memoryless nonlinearity are assumed to have several inputs and outputs. Continuous time systems and systems involving time lag are treated An extension to the main stability criterion may be applied when bounds are available on the slopes of the nonlinearity. It is shown that a simplified form of the criterion leads to a passivity condition for an N-port network. Although the stability criterion is in general difficult to apply, it is demonstrated that in some cases the condition may be implified and still give useful results. (Author)

AD-634 329 **Field 12B**
CFSTI Prices: HC$3.00 MF$0.50
Operations Research Center, Univ. of California, Berkeley.
NOTES ON OPERATIONS RESEARCH-5.
Research rept.
Apr 66, 54p ORC-66-13
Contract Nonr-222 (83), DA-31-124-ARO (D)-331
Projs. NR-047-033, RR-033-02-01
Grant NSF-GP-4593. See also AD-612 966.

Descriptors: (*Operations research, Theory), Statistical distributions, Monte Carlo method, Mathematical programming, Scheduling.

Contents: ARTICLES: Remarks about Random Sampling from Beta and Gamma Distributions, by Bennett Fox; Hanson's Dual Program, by R. N. Kaul; A Short Proof of Hu's Assembly Line Theorem, by Lars-Chr. Lorentzen; Proof of a Theorem from the Theory of Complementary Solutions of Linear Systems, by Lars-Chr. Lorentzen; Networks and Assembly Line Balancing, by Shishir Kumar Mukherjee; Summary of Klee's Results on Bounding the Number of Simplex Cycles, by Bennett Fox; REVIEW: Cycling in the Transportation Problem -- by B. J. Gassner; RESEARCH PROBLEMS, by George B. Dantzig; ABSTRACTS: Selected Thesis Abstracts in Operations Research.

AD-634 348 **Field 12B**
CFSTI Prices: HC$2.00 MF$0.50
RAND Corp., Santa Monica, Calif.
CONTRACTION MAPPINGS IN THE THEORY UNDERLYING DYNAMIC PROGRAMMING,
by Eric V. Denardo. Jun 66, 36p RM-4755-1-PR
Contract AF 49 (638)-1700
See also AD-629 920.

Descriptors: (*Optimization, *Dynamic programming), (*Mapping (Transformations), Dynamic programming), Decision theory, Model theory.

Identifiers: Contraction mapping.

The report contains a formulation and analysis of a broad class of optimization problems including many, but not all, dynamic programming problems. The formulation generalizers those of several authors and provides further insight into the class of problems which satisfy Bellman's Principle of Optimality. Three widely shared properties of optimization problems are abstracted; they are called 'contraction,' 'monotonicity,' and 'N-stage contraction' properties. Analysis is conducted of those classes of problems satisfying the first property, the first two properties, and the last two properties. In each case, a fixed-point argument guarantees that a functional equation have a unique solution; in the latter two cases that solution is the optimal return function. Policies whose return functions attain or approximate the fixed point are shown to exist, and three techniques for determining such policies are presented. The techniques are successive approximations, mathematical programming, and a generalization of one of Howard's policy improvement routines. Certain issues concerning history-remembering decision procedures and stationary processes are settled. Examples are provided, and apparent integrability issues in some of them are circumvented. (Author)

AD-634 366 **Field 12B, 9E**
CFSTI Prices: HC$3.00 MF$0.75
Illinois Univ., Urbana. Coordinated Science Lab.
A TOPOLOGICAL APPROACH TO THE STABILITY OF TIME-VARYING AND NONLINEAR NETWORKS,
by Tadao Murata. May 66, 67p Rept. no. R-291
Contract DA-28-043-AMC-00073 (E), Grant AF-AFOSR-931.65
Proj. DA-20014501B31F

Descriptors: (*Topology, *Electrical networks), Stability, Invariance, Time, Nonlinear systems, Synthesis.

Identifiers: Time-varying networks.

New techniques are presented which provide stability information for time-varying and nonlinear networks by inspection of the topology and the element values of the network. The derivation of the new techniques is based on Liapunov's second method for time-varying networks, his first method for nonlinear networks and network topology. More specifically, Liapunov's stability theorems of linear time-varying RLC networks are formulated in terms of the tree or chord-set products of the subnetworks derived from the state-space representation of the general networks. The local stability theorems of nonlinear time-invariant RC and RL networks are formulated in terms of the tree or chord-set products of subnetworks. Four examples are given to illustrate the above theorems. (Author)

AD-634 367 **Field 12B, 9E**
CFSTI Prices: HC$3.00 MF$0.75
Illinois Univ., Urbana. Coordinated Science Lab.
NONLINEAR PROGRAMMING AND MULTI-PARAMETER SENSITIVITY IN LINEAR TIME-INVARIANT NETWORKS,
by Gerry L. Kelly. Jun 66, 72p Rept. no. R-301
Contract DA-28-043-AMC-00073 (E), Grant AF-AFOSR-931-65
Proj. DA-20014501B31F
Grant AF-AFOSR-177-63.

Descriptors: (*Nonlinear programming, *Electrical networks), Linear systems, Sensitivity, Topology, Taylor's series.

Identifiers: Time-varying networks.

A computational solution is obtained to the multiparameter sensitivity problem for linear time-invarient networks in which large element variations are permitted. The various definitions of multiparameter sensitivity are critically reviewed and it is concluded that a definition which was proposed by Hakimi and Cruz is currently the most general since the other definitions are valid only for small variations in the network element values. Their definition of multiparameter sensitivity is extended to a measure over a band of frequencies and to such cases as n-port networks where it is desirable to consider more than one transfer function. A method is presented for the selection of the temperature coefficients of active-RLC networks to reduce multiparameter sensitivity. A second-order approximation to the network function variation is studied by considering the first three terms of a Taylor series expansion. A Mikulski-Ur type of correlation is obtained between the third Taylor series term and the classical root sensitivities. Also the first three Taylor series terms are related to the k-trees which Hakimi and Green defined. Blostein's results relating the sum of classical Bode sensitivity functions to the first derivative with respect to complex frequency is extended to the second derivative and n-th derivative cases. (Author)

AD-634 375 **Field 12B, 5J**
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
SOME PROBLEMS ASSOCIATED WITH SYSTEMS ANALYSIS,
by E. S. Quade. Jun 66, 22p P-3391
Prepared for presentation at the Electronic Industries Association Symposium on System Analysis in Decision Making, Washington, D. C., June 23-24, 1966.

Descriptors: (*Systems engineering, *Decision making), Effectiveness, Uncertainty, Operations research.

Identifiers: Systems analysis.

For abstract, see T 66 15.

AD-634 685 **Field 12B**
CFSTI Prices: HC$1.00 MF$0.50
Army Missile Command, Redstone Arsenal, Ala. Army Inertial Guidance and Control lab.
A STUDY OF SUB-OPTIMAL CONTROL LAWS,
by Kelly V. Grider. Jun 66, 15p
Presented at the Army Science Conference (1966), U. SM. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Control, Theory), Optimization, Matrix algebra, Vector analysis, Functional analysis, Differential equations.

For abstract, see T 66 15.

AD-634 772 **Field 12B, 4B**
CFSTI Prices: HC$1.00 MF$0.50
Wisconsin Univ., Madison. Dept. of Statistics.
KINEMATIC PROGRAMMING FOR RAIN.
Technical rept.,
by Mervyn Stone. May 66, 9p TR-71
Contract Nonr-1202 (17)
Proj. NR-042-222

Descriptors: (*Optimization, Mechanics), (*Rainfall, Countermeasures), Posture, Velocity, Mathematical programming.

A statement and resolution of the problem of the optimal speed and posture that should be adopted by a rigid body moving between two points in a uniform shower of hostile particles - in order to minimize total contact with the particles. (Author)

IDO-17142 **Field 12B**
CFSTI Prices: HC$2.00 MF$0.50
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
A NOTE ON INVERTING THE R-MATRIX,
by T. Watanabe. Jan 66, 24p
Contract AT (10-1)-205

Descriptors: (*Matrix algebra, Transormations (Mathematics)), (*S-matrix, Determinants).

For abstract, see T 66 15.

ORNL-3919 **Field 12B, 9B**
CFSTI Prices: HC$4.00 MF$0.75
Oak Ridge National Lab., Tenn.
MATHEMATICS DIVISION ANNUAL PROGRESS REPORT FOR PERIOD ENDING DECEMBER 31, 1965.
Apr 66, 119p
Contract W-7405-eng-26

Descriptors: (*Optimization, Computers), (*Programming (Computers), Nuclear physics).

For abstract, see N 20 12.

ORNL-3925 **Field 12B, 18J**
CFSTI Prices: HC$2.00 MF$0.50
Oak Ridge National Lab., Tenn.
CRITICAL-PATH METHOD FOR SCHEDULING THE TRANSURANIUM PROCESSING PLANT AN APPRAISAL,
by W. D. Burch, and C. H. Lamaster. Mar 66, 44p
Contract W-7405-eng-26

Descriptors: (*Transuranium elements, Processing), (*Scheduling, Management engineering).

For abstract, see N 20 12.

PB-169 659 **Field 12B, 5A**
CFSTI Price: HC$1.60
RAND Corp., Santa Monica, Calif.
DYNAMIC PROGRAMMING SOLUTION OF ALLOCATION PROBLEMS,
by Stuart E. Dreyfus. 9 May 57, 15p P-1083
AD-224 022

Descriptors: (*Scheduling, Dynamic programming), (*Dynamic programming, Scheduling), Management engineering, Numerical analysis, Partial differential equations, Production control.

Dynamic programming represents a general technique for formulating multi-stage and multi-activity decision process problems. Although the functional equation technique accomplishes a considerable reduction in the dimension of a problem, complex processes can still prove too large and time consuming for digital computation. In this paper the author considers allocation problems in some detail. He discusses the formulation and computational solution of a simplified model, then generalize to a more complex model. Numerical results are attained for the second model by use of the Lagrange multiplier approach. (Author)

AD-634 310 **See Field 5A**

AD-634 325 **See Field 9B**

PB-169 352 **See Field 9B**

13. MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING

ORNL-3918 **Field 13, 06R, 18I, 07A**
CFSTI Prices: HC$2.00 MF$0.50
Oak Ridge National Lab., Tenn.
SHIPPING COST COMPARISONS FOR LEAD, STEEL, AND URANIUM-SHIELDED CASK
by L. B. Shappert, and Royes Salmon. Mar 66, 20p
Contract W-7405-ENG-26

Descriptors: (*Radioactive waste, Transportation), (*Reactor shielding materials, Radioactive waste).

13A. AIR CONDITIONING, HEATING, LIGHTING, AND VENTILATING

AD-634 587 **Field 13A, 14B**
CFSTI Prices: HC$2.00 MF$0.50
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
A FILM COOLING EXPERIMENT ON A CONVERGENT-DIVERGENT NOZZLE,
by Henry F. Lewis, and Dennis D. Horn. Jun 66, 32p AEDC-TR-66-78
Contract AF 40 (600)-1200
Proj. AF-7778
Task 777805
Prepared in cooperation with ARO, Inc., Tullahoma, Tenn.

Descriptors: (*Convergent divergent nozzles, *Film cooling), Supersonic nozzles, Stainless steel, Air cooled, Temperature, Wind tunnel nozzles, Air.

A stainless steel, supersonic nozzle with an 11/16-in.-dian throat was successfully cooled using only a tangential air film. Mass fractions of cooling air film ranged from 0.190 to 0.302, and the maximum recorded wall temperature was 1800F. Stilling chamber pressures ranged from 482 to 577 psia and temperatures from 2615 to 3460F. Measured wall temperatures showed only limited agreement with a newly developed theory, with the theory underestimating adiabatic wall temperatures by from 20 to 30 percent. (Author)

AD-634 601 **Field 13A, 13J**
CFSTI Prices: HC$1.00 MF$0.50
Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn.
THERMAL STRESS AND TRANSIENT BEHAVIOR AND THERMAL FATIGUE CRITERIA OF MARINE RECUPERATORS.
Quarterly progress rept., 1 Jan-31 Mar 66.
31 Mar 66, 8p
Contract NObs-92558

Descriptors: (*Heat exchanges, Mechanical properties), Thermal properties, Stresses, Temperature, Test facilities, Marine engineering, Thermocouples, Measurement.

During this period the test facility was nearly completed. Four test modules out of thirty-one have been completed and facility shakedown is underway. (Author)

EURAEC-37 **Field 13A**
CFSTI Prices: HC$1.00 MF$0.50
Centro Informazioni Studi Esperienze, Milan (Italy).
CAN I.
Quarterly progress rept. no. 2, 1 Feb-30 Apr 60.
15 May 60, 20p CISE-R-20
Contract 002-59-11RDI
TID-12455 superseded.

Descriptors: (*Gas flow, Heat exchanges), (*Heat transfer, Steam power plants).

For abstract, see T 66 15.

PB-169 447 **Field 13A, 20E, 20F**
CFSTI Prices: HC$1.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
AN INVESTIGATION INTO THE RELATIVE SPECTRAL ENERGY DISTRIBUTION OF A XENON FLASH TUBE AS A FUNCTION OF ENERGY INPUT,
by E. J. Payne. Feb 65, 23p Technical rept. TR-65042

Descriptors: (*Flash lamps, Energy), Discharge tubes, Xenon, Spectroscopy, Gas Discharges, Lasers, Pumping (Optical), Great Britian.

Identifiers: Xenon lamps.

A calibrated photomultiplier and contract deviation spectrometer were used to measure the spectral energy distribution of a Xenon flash tube (600 Joules nominal rating). Results are given for a range of energy inputs and a constant pulse duration. (Author)

AD-634 211 **See Field 11F**

AD-634 256 **See Field 20M**

AD-634 504 **See Field 14B**

13B. CIVIL ENGINEERING

AD-634 149 **Field 13B, 14E, 5B**
CFSTI Prices: HC$2.00 MF$0.50
Northwestern Univ., Evanston, Ill. Dept. of Geography.
REMOTE SENSING AND URBAN INFORMATION SYSTEMS. FIVE PAPERS.
Technical rept.,
by William L. Garrison, Azriel Rosenfeld, Robert H. Alexander, Edwin N. Thomas, and Duane F. Marble. Apr 66, 29p TR-1
Contract Nonr-1228 (37)
Proj. NR-389-143

Descriptors: (*Urban planning, Data processing systems), (*Information retrieval, Urban planning), (*Aerial photography, Urban planning), (*Multiband spectral reconnaissance, Urban planning), Infrared photography, Urban areas, Mapping, Photogrammetry, Symposia.

This report consists of the following five papers which were presented at the Third Annual Conference on Urban Planning Information Systems, Chicago, Illinois, September, 1965: W. L. Garrison 'Demands for Small Area Data'; A. Rosenfeld 'Image Processing'; R. H. Alexander 'Multispectral Sensing of Urban Environments'; E. N. Thomas and D. F. Marble 'The Use of Remote Sensors in Urban Information Systems'; M. Thompson 'The Utilization of an Infrared Thermal Mapping System for Urban Planning'. (Author)

AD-634 470 **Field 13B**
CFSTI Prices: HC$1.60 MF$0.50
Cold Regions Research and Engineering Lab., Hanover, N. H.
PICTORIAL PERFORMANCE STUDY OF CAMP CENTURY (1960-1962).
Special rept.,
by Robert D. Leighty. Jan 63, 20p SR-56

Descriptors: (*Buildings, Arctic regions), (*Underground structures, Arctic regions), (*Civil engineering, Arctic regions), Construction, Photographs.

Identifiers: Camp Century.

During project activities at Camp Century in 1960 and again in 1962 an opportunity was afforded to obtain pictures of surface and subsurface features and conditions. Pictures taken in November 1960 can be compared to those taken in April 1962 from essentially the same location and a pictorial performance study of these locations can be made. The purpose of these comparative photographs is to present the information to CRREL personnel so that they are aware of the magnitude of the deformation problem. This is not meant to be a complete study, nor is comment given as to the reason for the observed changes.

AD-634 597 **Field 13B**
CFSTI Prices: HC$4.00 MF$0.75
Massachusetts Inst. of Tech., Cambridge. Operations Research Center.
A MODEL FOR TRAFFIC FLOWS ON A TWO-LANE TWO-WAY RURAL HIGHWAY.
Technical rept.,
by Ralph L. Miller. Jun 66, 105p TR-20
Contracts Nonr-1841 (87), Nonr-3963 (06)
Projs. NR-042-230, NR-276-004

Descriptors: (*Roads, *Traffic), (*Civil engineering, Roads), Vehicles, Velocity, Operations research, Mathematical models, Stochastic processes.

Identifiers: Highway traffic.

A stochastic model is developed to describe the behavior of traffic on a two-lane, two-way road. Unlimited visibility and absence of intersections are assumed. The inputs are free speed distribution and traffic density; the outputs are forced speed distributions, queue lengths, passing times, etc. Computer programs, sample problems, and applications are presented. (Author)

AD-634 633 **Field 13B**
CFSTI Prices: HC$1.00 MF$0.50
Army Engineer Research and Development Labs., Fort Belvoir, Va.
CLARIFICATION OF POTOMAC RIVER WATER WITH CATIONIC POLYELECTROLYTES,
by Maurice Pressman. Jun 66, 15p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Water supplies, Purification), (*Ion exchange resins, Water supplied), (Potomac River, Water supplies), Colloids, Ammonium compounds, Ion exchange, Chlorine, Liquid filters, Coagulation, Colors, Algae.

It is shown that, for the clarification of a natural water, a cationic polyelectrolyte of the poly-quaternary ammonium type can, even in the presence of normal amounts of chlorine, act effectively as a sole coagulant. It can replace a conventional metal salt in a system comprised of a solids-contact upflow type coagulation basin and a pressure-diatomite filter. (Author)

AD-634 692 **Field 13B, 6F, 4B**
CFSTI Prices: HC$1.00 MF$0.50
Army Tropic Test Center, Fort Clayton (Canal Zone).
THE POSSIBLE MILITARY SIGNIFICANCE OF CONTAMINANTS FOUND IN TROPICAL ATMOSPHERES,
by Robert S. Hutton. Jun 66, 13p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Atmosphere, Microorganisms), (*Air pollution, *Tropical regions), (*Microorganisms, Tropical degradation), Chemical contamination, Fungus deterioration, Tropical tests, Contamination.

The practical nature of the studies undertaken is emphasized by reference to the known tendency of the tropical environment to accelerate decomposition of organic materials. Several experiments conducted in a tropical environment offer strong, though not conclusive, evidence that microbiological activity deteriorates metals. Data were presented to show that the presence of microorganisms, and/or products of microorganisms, water, and cycling of temperature to force frequent wetting of surfaces, produced an effect on iron different from the effect caused by exposure to the ambient atmosphere of the Canal Zone. Furthermore, it was shown that unless these conditions were all present--microorganisms, water, and temperature fluctuations--iron surfaces remained unaffected. Supplementary data were presented to show that microorganisms may derive at least some nutrient from atmospheric chemical contaminants, and very preliminary statements were made concerning the results of atmospheric sampling done to determine the nature of the contaminants present in the tropical atmosphere. (Author)

BNWL-208 **Field 13B, 13G, 13M**
CFSTI Prices: HC$3.00 MF$0.75
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
AN EVALUATION OF THE USE OF SELECTIVE DISCHARGES FROM LAKE ROOSEVLET TO COOR THE COLUMBIA RIVER,
by R. T. Jaske. Feb 66, 88p
Contract AT (45-1)-1830

Descriptors: (*Dams, Hydraulic models), (*Rivers, Cooling).

For abstract, see T 66 15.

PB-169 384 **Field 13B, 6C**
CFSTI Prices: HC$1.60 MF$0.50
Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio.
POLLUTION AND THE LIFE IN WATER,
by Kenneth M. Mackenthun, and William Marcus Ingram.Oct 64, 20p
PHS-Pub-999-WP-20
Rept. on Environmental Health Series. Water Supply and Pollution Control.

Descriptors: (*Water pollution, Aquatic animals), Fishes, Plankton, Ecology, Toxicity, Plants (Biology), Biological assay, Wastes (Sanitary engineering), Sewage.

The study of aquatic organisms as they have been related to water supply and water pollution problems since 1850 is detailed. Significant contributions have been made that relate plankton, benthos, periphyton, and fish to the definition of organic, toxic, thermal, and silt pollution. Generally it is not realistic to isolate a particular genus or even a species of aquatic organism to indicate the presence or absence of pollutional wastes in water. It is the study of the total aquatic biota that tells one most about water conditions. Nevertheless, something equated with the magnitude of the problem that may be termed 'reality' often dictates the type of study and the kinds and numbers of samples collected. Serious thought should be given in the reporting of data to ensure that the final report is matched to the needs of the study and provides answers to questions responsible for the instigation of the study. (Author)

PB-169 495 **Field 13B, 14E, 8B**
CFSTI Prices: HC$1.00 MF$0.50
Bureau of Public Roads, Washington, D. C. Office of Research and Development.
AERIAL PHOTOGRAPHY IN THE UNIFIED INFORMATION SYSTEM,
by Bernard J. Colner. Jan 66, 21p Rept. no. 0380
Prepared for presentation at Photogrammetry and Aerial Survey Committee, Dept. of Design, Annual Meeting of Highway Research Board of Natl. Academy of Sciences (45th), Washington, D. C., Jan 66.

Descriptors: (*Aerial photography, Civil engineering), (*Roads, Photogrammetry), Design, Construction, Maintenance, Data storage systems, Digital computers, Programming (Computers).

A study was made of the use of aerial photography and data banks in providing a unified information system for highway engineers who normally require a vast quantity of data to cope with problems in highway planning, design, construction, and maintenance. The system is an integrated photogrammetric data bank which was developed, using principally aerial photography, semiautomated analog-digital readout equipment, automated line plotters and electronic data processing. The objective of the photogrammetric data bank is to provide data and information to the highway engineer for work in which road and area details are necessary; the advantages are speed, accessibility, and flexibility.

PB-170 735 **Field 13B, 7A, 13M**
CFSTI Prices: HC$8.10 MF$2.25
Office of Saline Water, Washington, D. C.
1,000,000 GALLON PER DAY MULTISTAGE MULTIEFFECT IMPROVED DISTILLATION SEA WATER CONVERSION PLANT AT SAN DIEGO, CALIFORNIA.
Specification documents, conditions, detail specifications and small drawings,
by Frank C. DiLuzio. 24 Jan 66, 506p Spec-507
Specifications for contract OSW-14-01-0001-507.

Descriptors: (*Sea water, Desalination), (*Desalination, Distilling plants), (*Distilling plants, Construction), (*Evaporators, Construction), Specifications, Mechanical drawings, Water supplies, Pumps, Compressors, Heat exchangers, Buildings, Structures, Foundations, Soil mechanics, California.

Identifiers: Flash evaporation.

Contents: BIDDING DOCUMENTS; Mechanical equipment; Flash Evaporator and Auxiliaries; Condensate Return and Waste Water Sump Pumps, Plant Air Compressor and Air Receivers, Instrument Air Dryer, Mobile Crane; General Technical (Structural Design, Excavation and Grading, Concrete, Structural Steel, Building, Asphalt Paving, Oiling and Gravel Surfacing, Piping, Electrical Work, Instrumentation, Heat Insulation, Painting); Drawing list; Technical data schedules (Plant Equipment List, Pumps and Drivers, Heat Exchangers, Instrument Data Sheets, Compressor, Special Tools and Spare Parts); Report of Foundation Investigation of the proposed site near Chula Vista, Calif.

AD-470 096 **See Field 8M**

AD-634 239 **See Field 12B**

AD-634 469 **See Field 8L**

AD-634 614 **See Field 1E**

AD-634 637 **See Field 8H**

AD-634 738 **See Field 13M**

PB-169 571 **See Field 13F**

PB-169 850 **See Field 5A**

PB-169 893 **See Field 6F**

PB-170 270 **See Field 5C**

66-1-RE **See Field 18L**

13C. CONSTRUCTION EQUIPMENT, MATERIALS, AND SUPPLIES

PB-169 497 **Field 13C, 11B, 11D**
CFSTI Prices: HC$2.00 MF$0.50
Fritz Engineering Lab., Lehigh Univ., Bethlehem, Pa.
REINFORCEMENT LAP FAILURES.
Continuously reinforced concrete pavements rept. no. 8,
by R. G. Adams, and D. A. Van Horn. Sep 64, 34p Fritz Report-289-1
Investigation sponsored by Pennsylvania Dept. of Highways and Bureau of Public Roads, Washington, D. C.

Descriptors: (*Reinforced concrete, Failure (Mechanics)), Loading (Mechanics), Concrete, Tests, Bonding, Thermal stresses.

The report describes a series of load tests on reinforced concrete slab specimens designed to simulate sections of continuously reinforced concrete pavement. The specimens were 22 feet in length and 8 inches in depth. All of the specimens were subjected to the same test program which consisted of three load cycles and an ultimate load test. The load cycles were designed to simulate temper-

ature effects which might be encountered in the State of Pennsylvania. The failure criteria was based on width of crack at the splice during the load cycles - if the width of the crack reached 0.1 inch, failure had occurred. All of the specimens successfully withstood the three cycles of loading and the performances during the ultimate load tests were all satisfactory. (Author)

AD-634 691 **See Field 18C**

PB-170 537 **See Field 5C**

13D. CONTAINERS AND PACKAGING

AD-449 910 **Field 13D**
CFSTI Price: HC$1.10
Army Foreign Science and Technology Center, Washington, D. C.
FLEXIBLE CONTAINERS FOR UNDERWATER STORAGE OF LIQUID FUELS,
by A. L. Koshevoi. 19 Oct 64, 7p FSTC-381-T64-19
Proj. G7-1050
TT-66-61127
Trans. of Sudostroenie (USSR) v26 n3 p65-6 1960.

Descriptors: (*Containers, Underwater), (*Fuels, Storage), Fuel tanks, Storage tanks, Liquids, Flexible structures, USSR.

The flexible containers of the Sasek system are made in cylindrical shape with spherical ends with volumes of 5 and 10 cu m and in the form of a cushion with volumes of 10, 25, and 50 cu m. At the present time a container of 100 cu m capacity is being developed. The flexible containers are made in several layers with a total thickness of 6-8 mm: the first layer (inner) of neoprene, second and fourth of nylon, third and fifth of rubber, sixth of rubber resistant to action of sea water and the atmosphere.

AD-634 477 **See Field 10B**

Y-1531 **See Field 18G**

13E. COUPLINGS, FITTINGS, FASTENERS, AND JOINTS

LA-3454 **Field 13E, 14B**
CFSTI Prices: HC$1.00 MF$0.50
Los Alamos Scientific Lab., Univ. of California, N. Mex.
CRYOGENIC EVALUATION LABORATORY TEST OF A (MASONEILAN) CRYOGENIC LOW-PRESSURE COUPLING,
by D. H. Liebenberg. 2 Jan 66, 9p
Contract W-7405-eng-36

Descriptors: (*Couplings, Low-pressure research), (*Cryogenics, Couplings).

AD-634 260 **See Field 13H**

13F. GROUND TRANSPORTATION EQUIPMENT

AD-634 605 **Field 13F**
CFSTI Prices: HC$1.00 MF$0.50
Marine Corps Landing Force Development Center, Quantico, Va.
LOADER, SCOOP TYPE.
Final rept.
17 Jun 66, 5p
Proj. 45-65-04

Descriptors: (*Tractors, *Vehicle chassis components), Military requirements, Design, Tires, Feasibility studies.

Identifiers: Loaders (Tractors).

It is not feasible to replace Section 'M' allowances for the D-6 crawler tractor with rubber tired scoop loaders. Rubber tired scoop loaders are required in Marine aviation units in addition to the D-6 crawler tractors currently authorized. The D-6 crawler tractor currently authorized is unsuitable for use under adverse weather conditions. The TD-15 crawler tractor, or equal, with 4 in 1 bucket and rear end winch is a desirable replacement for the D-6 crawler tractor. The allowances reported would provide the required crawler tractors and related rubber tired equipment for Marine aviation units. (Author)

AD-634 606 **Field 13F**
CFSTI Prices: HC$1.00 MF$0.50
Marine Corps Landing Force Development Center, Quantico, Va.
TEST OF BUMPER REPLACEMENT KIT FOR TRUCK, UTILITY, 1/4-TON, 4X4, M422/M422A1.
Final rept.
21 Jun 66, 4p

Descriptors: (*Cargo vehicles, Spare parts), (*Vehicle chassis components, Cargo vehicles), Tests.

Identifiers: M-422 vehicles (1/4-ton).

After tests, it was concluded (a) that the replacement bumper provides adequate lifting capability with standard Marine Corps slings and is a marked improvement over the present bumper. (b) that no deficiencies exist in the hardware, installation instructions, and drawings contained in the bumper replacement kit.

AD-634 611 **Field 13F**
CFSTI Prices: HC$1.00 MF$0.50
Marine Corps Landing Force Development Center, Quantico, Va.
PRODUCT IMPROVEMENT ITEMS; 21/2-TON AND 5-TON VEHICLES.
Interim rept.,
by E. H. Hurst. 23 Jun 66, 2p
Proj. CMC-46-66-01

Descriptors: (*Cargo vehicles, Tests), Drives, Exhaust systems, Performance (Engineering).

Identifiers: M-34 vehicles (2-1/2-ton).

One 21/2-ton 6x6, M35A2C, equipped with a positive air-shift engagement of the front axle drive, and the vertical muffler modification was service tested. The test vehicle was received on 27 April 1966 and has accumulated 2360 test miles. Testing included operations on paved highway, graded gravel roads and cross-country.

AD-634 613 **Field 13F**
CFSTI Prices: HC$1.00 MF$0.50
Marine Corps Landing Force Development Center, Quantico, Va.
TEST OF DROP-SIDE BED, 21/2-TON AND 5-TON VEHICLE.
Interim rept.,
by E. H. Hurst. 20 Jun 66, 13p

Descriptors: (*Cargo vehicles, Tests), (*Vehicle chassis components, Cargo vehicles), Military personnel, Design, Seats, Fork-lift vehicles.

Identifiers: M-35 trucks (2-1/2-ton), M-54 trucks (5-ton).

A service test of military potential was conducted on the 2 1/2 and 5 ton cargo vehicles, equipped with drop-side beds. Four test vehicles were evaluated, two 2 1/2 ton 6x6 M35A2C and two 5 ton 6x6 M54A2C cargo trucks. On these vehicles, both sides of the cargo beds can be lowered to provide a flat bed for cargo handling.

AD-634 618 **Field 13F**
CFSTI Prices: HC$1.00 MF$0.50
Army Tank-Automotive Center, Warren, Mich.
WALKING MACHINE STUDIES,
by Ronal A. Liston. Jun 66, 15p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Vehicles, Feasibility studies), (*Musculoskeletal system, Amplifiers), Control systems, Machines, Terrain, Cybernetics, Legs, Servomechanisms, Motion, Maneuverability, Reviews.

Identifiers: Man amplifier, Walking machines.

Advantages and disadvantages of walking machines are presented, along with specifications which would be desirable.

AD-634 659 **Field 13F**
CFSTI Prices: HC$1.00 MF$0.50
Army Natick Labs., Mass.
APPLICATION OF QUANTIFIED TERRAIN DATA TO VEHICLE DESIGN CRITERIA,
by Robert L. Anstey. Jun 66, 14p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Vehicles, *Terrain), Trafficability, Armed forces transportation, Design, Standards, Soil mechanics.

In order to develop terrain design criteria applicable to increasing off-road capability, it is essential that the microgeometry of the world's landforms be investigated quantitatively, that the data be reduced to frequency curves or similar tabulations, and that comparative analyses be made between these data and present critical vehicle performance characteristics. Inasmuch as a single agency could not catalog all of the world's terrain in the required detail in a reasonable period of time due to normal personnel and funding limitations, it is essential that the task be divided among several agencies. The first step in setting up a cooperative program would be to select representative sample landforms in each major region for detailed study. Investigations of a single landform, alluvial fans, in a single region demonstrate that terrain design criteria can be developed from these data, especially when these data are quantified and their frequencies of occurrence are determined. (Author)

PB-169 571 **Field 13F, 13B**
CFSTI Prices: HC$4.00 MF$0.75
Operations Research, Inc., Silver Spring, Md.
OPERATING CONCEPTS; FUNCTIONS OF AN ATTENDANT ABOARD AN AUTOMATED TRAIN; PRELIMINARY ESTIMATE OF ZONE FARE-COLLECTION COSTS,
by M. Cornell, E. Dwyer, R. Woodhead, R. M. Karow, and E. W. Marlowe. Apr 64, 110p
Technical repts. TR-201, 270, 271
Contract NTA-36
Task 1.1

Descriptors: (*Railroads, District of Columbia), (*Urban planning, Railroads), Economics, Transportation, Urban areas, Personnel, Operations research, Civil engineering.

Identifiers: Rapid transit systems, Washington Metropolitan Area, National Capital Region.

This report presents the results of a preliminary analysis of several track arrangements and types of operation that might be applicable to the route

structure, traffic projections, and service standards set by the National Capital Transportation Agency in their November 1962 report. The principal function of the system is to provide commuter service for people employed in downtown Washington. Therefore, traffic is largely in one direction at any time on the outlying lines. It was established that two tracks will carry the projected traffic with adequate margin. Because of these factors, four tracks were not considered in this study. Three-track lines were considered for the close-to-town portions of longer routes, not to increase capacity, but to improve trip times in the direction of heavier travel. The improvement is small compared with the total added cost of a third track, including switches, controls, and station platforms. Furthermore, there is available space for only two tracks over much of the route considered for a third track, and the cost of additional land acquisition or structures to accommodate the third track would be prohibitive. Therefore, the largest portion of the study dealt with various operating concepts applicable to two-track lines with and without passing sidings at stations. (Author)

AD-402 391 See Field 8M

AD-634 622 See Field 8M

13G. HYDRAULIC AND PNEUMATIC EQUIPMENT

AD-472 407 **Field 13G**
CFSTI Prices: HC$2.75 MF$1.25
Redstone Scientific Information Center, Redstone Arsenal, Ala.
SURVEY OF AVAILABLE HIGH PRESSURE PNEUMATIC COMPONENTS (5,000 PSI AND UP),
by Herbert H. Hoop. 30 Jul 65, 257p RSIC-424
Prepared in cooperation with National Aeronautics and Space Admin., Geo. C. Marshall Space Flight Center, Huntsville, Ala.

Descriptors: (*Pneumatic devices, High-pressure research), Catalogs, Gas filters, Pneumatic valves, Pressure regulators, Check valves, Hoses, Pressure, High-pressure valves, State-of-the-art reviews.

The response of approximately 340 manufacturers of pneumatic components, from 622 contacted, has revealed that over 30 companies list items rated for pressures of 10,000 psi or greater and over 40 list items above 5000 psi. Several items are rated for 30,000 60,000, 75,000, and 150,000 psi. Most of the components rated for 10,000 psi or greater pressures are miniature or designed for low volume flow. Approximately ten companies list large volume components rated for pressure of 10,000 psi. Information was requested on the following components: filters, relief valves, regulators, check valves, solenoid valves, hand valves, shutoff valves, and flex hose. However, other components have been listed, including those rated for 5000 psi or higher pressures. (Author)

AD-634 397 **Field 13G**
CFSTI Prices: HC$4.00 MF$0.75
Bureau of Ships, Washington, D. C.
HYDRAULIC AUTOMATION SYSTEMS,
by M. D. Lemberg. Jun 66, 115p BuShips Trans-984
TT-66-61512
Trans. of mono. Sistemy Gidroavtomatiki, Moscow, 1965.

Descriptors: (*Hydraulic systems, Automation), (*Control systems, Hydraulic systems), USSR, Automatic, Seromechanisms, Computer logic.

The book contains materials on the classification, principle of operation, and range of application of hydraulic atuomation systems. In the book, consideration is given to the principal layouts and equipment involved in the systems of automatic control and regulation, constructed on hydraulic automation elements. The book is intended for engineering-technical workers concerned with the problems of the automation of the production processes. (Author)

AD-634 527 **Field 13G**
CFSTI Prices: HC$4.00 MF$0.75
Franklin Inst. Research Labs., Philadelphia, Pa.
DYNAMIC PERFORMANCE ANALYSIS OF PURE FLUID AMPLIFIERS AND PURE FLUID COMPUTATIONAL CIRCUIT STUDIES.
Final technical rept., Sep 63-Sep 65,
by Ka-Cheung Tsui, and John Stone. Jan 66, 106p F-B2148-1
Contract DA-49-186-AMC-95 (D)

Descriptors: (*Fluid amplifiers, Fluid mechanics), Functions, Feedback ampliefirs, Computer logic, Integrators (Computers), Performance (Engineering), Analog computers, Analysis.

Analytical models and experimental results of the dynamic behavior of proportional pure fluid amplifiers are presented. The fluid amplifier frequency responses calculated from the dirived equivalent circuit show good correlation with the experimental frequency responses recorded under various operating conditions. A method of measuring the fluid amplifier transfer function by use of an electronic analog computer operated in conjunction with the fluid amplifier was devised and analyzed. This method can provide mid frequency performance information of the unknown by using a relatively low frequency test signal. A pure fluid integrator using a beam deflection type proportional amplifier with positive feedback as the active circuit element has been developed and discussed. An equivalent circuit analysis and experiments has been performed to show the time integration characteristics of the preliminary design, experimental model. (Author)

N66-16075 **Field 13G**
CFSTI Prices: HC$4.00 MF$0.75
Sperry Utah Co., Salt Lake City.
STUDY OF PURE FLUID PHENOMENA.
Final rept. 28 May-15 Dec 65,
15 Dec 65, 113p
Contract NAS8-20102
NASA-CR-69627

Descriptors: *Dynamic pressure, *Logic circuit, *Pressure ratio, *Similarity hypothesis, *Fluid mechanics.

For abstract, see T 66 15.

AD-427 305 See Field 13M

BNWL-208 See Field 13B

13H. INDUSTRIAL PROCESSES

AD-433 559 **Field 13H, 22B, 11F**
CFSTI Price: HC$4.00
American Machine and Foundry Co., Alexandria, Va.
DEPOSITION FORMING PROCESSES FOR AEROSPACE STRUCTURES.
Final technical documentary rept., 31 Jul 61-31 Oct 63,
by M. E. Browning, H. W. Leavenworth Jr, W. H. Webster Jr, and F. J. Dunkerley. Jan 64, 141p
Contract AF33 (657)-7016
Proj. AF-7-905
ML-TDR-64-26, N64-18564

Descriptors: (*Electrodeposition, Aerospace craft), (*Vapor plating, Aerospace craft), Alloys, Niobium alloys, Tunsten alloys, Nickel, Structural parts.

Nine deposition processes were reviewed with appropriate screening tests to determine their applicability for development as deposition forming processes. Program objectives were the development of deposition forming systems capable of producing complex aerospace components from alloys difficult to fabricate by conventional techniques. Electroforming, chemical vapor deposition, and an electrocombination process were selected. A Cb-W alloy was deposited by the chemical vapor deposition method but formed structures could not be successfully removed from the mandrel. Nickel containing a dispersion-hardening phase was deposited by the electrocombination method; further scale-up development is indicated to exploit the promising results of using this unique method of fabricating aerospace components from dispersion-hardened metals. Electroforming was proven to have very promising potential as a practical manufacturing method for producing components typical of aerospace designs from difficult-to-fabricate alloys; this was achieved by developing a complete cobalt base quaternary electroforming system and the production of several complex free standing shapes to demonstrate its applicability. (Author)

AD-465 025 **Field 13H, 13J, 11F**
CFSTI Prices: HC$3.00 MF$0.50
Massachusetts Inst. of Tech., Cambridge.
ROLLING HISTORY IN RELATION TO THE TOUGHNESS OF SHIP PLATE.
Final rept.,
by B. M. Kapadia, and W,. A. Backofen. May 65, 55p
Contract NObs-88282
Proj. SR-147
SSC-168
Rept. on proj. Mill Rolling Practice.

Descriptors: (*Ship plates, Toughness), (*Rolling (Metallurgy), Ship plates), Steel, Grain structures (Metallurgy), Brittleness, Heat treatment.

Plates of ABS Class-B and Class-C steel were rolled with different temperature-reduction schedules to observe effects of processing history on final structure and properties. Each class was finished at a constant thickness (1-1/2-inch for Class B; 1-1/4-inch for Class C) following both isothermal and non-isothermal schedules with reductions from 15 percent to 60 percent and temperatures in the range 1250F (677C) to 2000F (1093C). The principal measurements for toughness evaluation were the 15 foot-pound V-notch Charpy, the 50 percent-fibrous Charpy, and the tensile-ductility transition temperatures. The superior toughness of Class C at constant grain size was an example of an extra-grain-size effect of composition. Normalizing of Class B plates after rolling produced Widmanstatten structure and some embrittlement which was interpreted as an apparent extra-grain-size effect of this particular heat treatment. Mechanical fibering was studied with techniques that included electron microscopy, but the contribution of microfissuring effects to toughness was too subtle for observaton. Embrittlement from residual cold work as a consequence of low-temperature finishing was also identified. Results of heat treatment after rolling were studied in detail. (Author)

AD-470 066 **Field 13H, 9A**
CFSTI Prices: HC$1.10 MF$0.50
Marine Corps. Landing Force Development Center, Quantico, Va.
EVALUATION OF ULTRASONIC CLEANER.
Final rept.,
by F. L. Wieseman. 2 Sep 65, 3p

Descriptors: (*Cleaning, Ultrasonic radiation), (*Ultrasonic radiation, Cleaning), (*Electronic equipment, Cleaning), (*Communication equipment, Cleaning), Maintenance, Electrical equipment, Military requirements, Feasibility studies.

The feasibility of employing an ultrasonic cleaner at maintenance activities of 3rd echelon and higher to permit salvage and detailed cleaning of electrical and mechanical components of communication-electronics equipment was established.

AD-634 141 **Field 13H, 11F**
CFSTI Prices: HC$7.00 MF$1.75
Battelle Memorial Inst., Columbus, Ohio.
DEFORMATION PROCESSING OF TITANIUM AND ITS ALLOYS,
by A. F. Gerds, D. E. Strohecker, T. G. Byrer, and F. W. Boulger. 18 Apr 66, 337p
Contract DA-01-021-AMC-11651 (Z)
NASA-TM-X-5348; RSIC-420
See also AD-633 512.

Descriptors: (*Material forming, *Titanium), (*Titanium alloys, Material forming), Deformation, Rolling (Metallurgy), Extrusion, Forging, Machine tools, Drawing (Machine processing), Pipes, Mechanical working, State-of-the-art reviews.

The report covers the state of the art of both primary and secondary fabrication methods for titanium and its alloys and is oriented toward the interests of the designer and the manufacturing engineer. Methods currently employed for primary fabrication of titanium include rolling, extrusion, forging, and drawing of tube, rod and wire. Secondary metalworking operations are those processes that produce finished parts from sheet, bar, or tubing using additional metalforming operations. The following secondary forming processes are discussed: brake bending, deep drawing, spinning and shear, drop hammer, trapped rubber, stretch, tube, roll, dimpling, joggling, and hot sizing. Equipment and tooling that are used for the various operations are discussed and illustrated wherever possibe. (Author)

AD-634 192 **Field 13H, 11F**
CFSTI Prices: HC$4.00 MF$0.75
Battelle Memorial Inst., Columbus, Ohio.
THE MAKING OF TITANIUM AND TITANIUM-ALLOY SHAPES BY CASTING, POWDER METALLURGY, AND OTHER PROCESSES,
by J. G. Kura, V. D. Barth, H. McCurdy, W. H. Safranek, and E. T. Hall. 18 Apr 66, 125p
Contract DA-01-021-AMC-11651 (Z)
NASA-TM-X-53437, RSIC-471
See also AD-633 039.

Descriptors: (*Titanium alloys, Material forming), (*Titanium, Material forming), (*Material forming, State-of-the-art reviews), Sintering, Casting, Structural parts, Electroforming, Vapor platings, Flame spraying, Vacuum apparatus, Hot working, Rolling (Metallurgy), Furnaces, Tensile properties, Hardness, Aluminum alloys, Vanadium alloys, Refining (Metallurgy), Density, Manganese alloys, Fiber metallurgy, Powder metals, Tin alloys, Molding materials, Powder metallurgy.

The state of the art of making titanium and titanium-alloy shapes by methods other than machining from wrought materials is reviewed. The methods covered are casting, powder metallurgy, metal spraying, electroforming and chemical vapor deposition. Of these methods only casting and powder metallurgy are being used to any great extent or offer a great deal of promise. Metal spraying may have some very specialized applications. In their present state of development electroforming and chemical vapor deposition are not promising methods for making titanium parts. (Author)

AD-634 260 **Field 13H, 13E, 11F**
CFSTI Prices: HC$3.00 MF$0.75
Battelle Memorial Inst., Columbus.
MECHANICAL FASTENING OF NICKEL-BASE ALLOYS,
by D. L. Cheever, R. E. Monroe, and D. C. Martin.20 Apr 66, 89p
Contract DA-01-021-AMC-11651 (Z)
NASA--TM-X-53441, RSIC-%09

Descriptors: (*Nickel alloys, *Joints), (*Mechanical fasteners, Nickel alloys), Riveted joints, Bolted joints, Metal joints, Joining, Corrosion, Bolts, Rivels, Design, Screws, Mechanicat properties, Coatings, Antiseize compounds, Fastenings, Machining, Cleaning, Corrosive liquids, Liquid metals, State-of-the-art reviews.

This report covers the state of the art of mechanical fastening of nickel-base alloys. The designing, forming, machining, assembling, and inspection of nickel-base joints are described in detail when the processes used are known to differ markedly from those processes used for common steel, aluminum, and copper alloys. (Author)

AD-634 336 **Field 13H, 11F**
CFSTI Prices: HC$5.00 MF$1.00
Battelle Memorial Inst., Columbus, Ohio.
JOINING OF NICKEL AND NICKEL-BASE ALLOYS,
by J. J. Vagi, R. E. Monroe, R. M. Evans, and D. C. Martin.20 Apr 66, 155p
Contract DA-01-021-AMC-11651 (Z)
NASA-TM-X-53447, RSIC-484

Descriptors: (*Nickel alloys, *Thermal joining), (*Nickel, Thermal joining), State-of-the-art reviews, Welding, Brazing, Soldering, Cleaning, Machines, Stresses, Defects (Materials), Contamination, Fracture (Mechanics), Arc welding, Resistance welding, Electron beam welding, Welds, Joining.

The state of the art of the joining of nickel and nickel-base alloys that contain at least 50 per cent nickel is reviewed. This report covers joining by welding, brazing, and soldering. Joining preparations, specific joining processes, joining dissimilar metals, and joint quality are discussed. (Author)

AD-634 354 **Field 13H, 9A, 11B**
CFSTI Prices: HC$4.00 MF$0.75
Beryllium Corp., Reading, Pa.
PRODUCTION ENGINEERING MEASURE FOR BERYLLIUM OXIDE AND PARTS PRODUCED FROM IMPORTED ORES.
Final rept., 1 Jul 63-30 Jun 65,
by J. K. Evans, H. F. Lebo, and J. F. Blum. 30 Jun 65, 115p
Contract DA-36-039-AMC-01481 (E)
See also AD-619 374.

Descriptors: (*Electronic equipment, Ceramic materials), (*Ceramic materials, *Powder metallurgy), (*Beryllium compounds, Oxides), Extrusion, Powders, Sintering, Dielectrics, Microstructure, Electrical properties, Deformation, Thermal conductivity, Metal coating, Particle size, Manufacturing methods, Mechanical working.

Identifiers: Beryllium oxide, Beryllium sulfate, Compacts.

The purpose of the study was to produce four typical electronic parts from beryllium oxide powder with mass production type facilities. The study involved the establishment of a powder processing facility to produce a uniform powder from batch to batch in production size quantities. The second phase of the study required the development of a pilot plant fabrication line to produce uniform parts from the powder.

AD-634 361 **Field 13H, 11B**
CFSTI Prices: HC$4.00 MF$1.00
Linden Labs., Inc., State College, Pa.
CHEMICAL STRENGTHENING OF CERAMIC MATERIALS.
Summary rept., 7 Apr 65-6 Apr 66,
by Henry P. Kirchner, Robert M. Gruver, and Ralph E. Walker. 7 May 66, 139p
Contract NOw-65-0407-c
Proj. WR-007-04-01

Descriptors: (*Ceramic materials, *Heat treatment), (*Surface properties, Ceramic materials), Thermal expansion, Thermal stresses, Shock resistance, Deformation, Thermal properties, Aluminum compounds, Oxides, Silicates, Titanium compounds, Spinel, Magnesium compounds, Nickel compounds, Zirconium compounds, Case hardening, Ceramic coatings, Solid solutions, Precision finishing, Fluorination, Sintering, Toughness, Compressive properties.

An investigation of the effect of compressive surface layers on the strength of polycrystalline ceramic bodies is described. Low expansion surface layers were formed on polycrystalline ceramics by chemical reactions at high temperatures. During cooling after sintering, the main body tends to contract more than the surface layers leading to compressive stresses in the surfaces. Failure, by shearing of the surface layers, was prevented by establishing gradual variations in composition within the body. These variations in composition result in variations in expansion coefficient which, in turn, result in gradual variations in stresses and reduction of the maximum shear stress in the surface layer. The compressive stresses may act to reduce the contribution of surface flaws to the structural failure of these bodies. Chemical strengthening was attempted with alumina, titania, spinel, magnesia, forsterite, steatite, nickel oxide and zirconia bodies and was achieved for the first six materials named. The experiments with nickel oxide and zirconia gave unreliable results. (Author)

AD-634 392 **Field 13H, 20B**
CFSTI Prices: HC$1.00 MF$0.50
Naval Ordnance Lab., White Oak, Md.
POLISHES AND ETCHES FOR TIN TELLURIDE, LEAD SULFIDE, LEAD SELENIDE, AND LEAD TELLURIDE: SUPPLEMENT.
Final rept. Jun 63-Feb 66,
by Marriner K. Norr. 17 Mar 66, 15p NOLTR-66-32
Proj. FR-46
See also AD-423 367.

Descriptors: (*Chemical milling, Crystals), (*Etching, Crystals), (*Electrolytic polishing, Crystals), (*Crystals, Precision finishing), Tin alloys, Tellurium alloys, Lead alloys, Lead compounds, Sulfides, Selenium alloys, Intermetallic compounds, Crystal lattice defects.

Identifiers: Etches, Polishes, Tin telluride, Lead sulfide, Lead selenide, Lead telluride.

This report is a continuation of NOLTR 63-156 (AD-423 367). Together, the two reports present a review of chemical and electrolytic polishes and dislocation etches for SnTe, PbS, PbSe, and PbTe, covering the period from 1907 through 1965. The present report also describes a new polish and a new dislocation etch for tin telluride, as well as tests on and improvements in some of the polishes reported in earlier publications. (Author)

AD-634 532 **Field 13H, 11F**
CFSTI Prices: HC$3.00 MF$0.75
Battelle Memorial Inst., Columbus, Ohio.
MECHANICAL FASTENING OF TITANIUM AND ITS ALLOYS,
by D. L. Cheever, R. E. Keith, R. E. Monroe, and D. C. Martin. 20 Apr 66, 69p
Contract DA-01-021-AMC-11651 (Z)
NASA-TM-X-53442, RSIC-502

Descriptors: (*Titanium, *Joining), (*Titanium alloys, Joining), (*Mechanical fasteners, Titanium), State-of-the-art reviews, Metal joints, Preparation, Design, Mechanical forming, Cleaning, Machining.

This report covers the state of the art on mechanically fastening titanium and its alloys. The report emphasizes the differences that are encountered in designing, forming, machining, and assembling titanium joints as compared with the standard practices for more common alloys. (Author)

AD-634 571 **Field 13H, 11F**
CFSTI Prices: HC$1.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England).

THE USE OF PINS WITH FLATS TO INCREASE THE FATIGUE LIFE OF ALUMINUM ALLOY LUGS.
Technical rept.,
by B. C. Clarke. Jan 66, 12p TR-66015

Descriptors: (*Aluminum alloys, Metal joints), (*Metal joints, Fatique (Mechanics)), Great Britain, Rods, Machining, Configuration, Stresses.

Pins with machined flats were used to improve the fatique life of aluminium alloy lugs. A worthwhile increase in life was obtained, the magnitude of which depended on the depth of flat. The choice of optimum pin geometry is discussed. (Author)

AD-634 585 **Field 13H, 11F**
CFSTI Prices: HC$8.60 MF$0.75
National Aero- and Astronautical Research Inst., Amsterdam (Netherlands).
RESEARCH ON CUMULATIVE DAMAGE IN FATIGUE OF RIVETED ALUMINUM ALLOY JOINTS,
by J. Schijve, and F. A. Jacobs. 1966, 84p NLL-TR-M-1999
Contract AF 61 (514)-812

Descriptors: (*Riveted joints, *Aluminum alloys), (*Fatigue (Mechanics), Riveted joints), Netherlands, Degradation, Loading (Mechanics), Tests, Life expectancy, Stresses, Experimental data.

Two-step tests and interval tests were performed on 24 S-T Alclad riveted lap joints to study the cumulation of fatigue damage in this type of joint and to verify the linear cumulative damage rule. Available data on light alloy specimens are reviewed and compared with the results of the present investigation. It is tried to establish some general trends of the cumulative damage phenomenon. Some proposed cumulative damage rules are discussed with respect to the experimental results and general accepted features of the fatigue phenomenon. Some remarks are made on the life estimation of structures under service loading. Proposals for further investigation are made. (Author)

AD-634 669 **Field 13H, 11F**
CFSTI Prices: HC$1.00 MF$0.50
Army Materials Research Agency, Watertown, Mass.
ANISOTROPY AND ITS RELATIONSHIP TO DEEP DRAWING OF A 5% Cr TOOL STEEL (H-11) FOR THE HAWK MISSILE,
by Robert M. Colton, and James D. Colgate.Jun 66, 15p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Anisotropy, *Hydroforming (Mechanical)), (*Tool steels, Drawing (Machine processing)), Chromium alloys, Rolling (Metallurgy), Temperature, Transition temperature, Strain (Mechanics), Failure (Mechanics), Silicon alloys, Molybdenum alloys, Vanadium alloys.

Identifiers: Hawk.

CONCLUSIONS: The primary causes for poor drawability of the H-11 sheet material were excessively high values of planar anisotropy (delta R), caused by low hot-rolling finishing temperatures, and incomplete spheroidization. Material exhibiting minimum elongation values of 25%, maximum yield strength values of 55,000 psi, and a maximum delta R value of (.25) resulted in acceptable drawability for the conditions imposed. All heats of the H-11 sheet evaluated, with the exception of heat 82 (R' = 1.04, 1.09, 1.27, 1.52), exhibited R' values from .90 - .99. This range at best indicated only fair drawability. Consequently, even with drawing variables kept at optimum levels, the severity of 'hydro-forming' the accumulator dome, caused a base level failure rate during drawing, of approximately 2-9%. Only when R>1.0 could one expect the base level failure rate to be less than this range. Since R' increases linearly as delta R in order to have improved drawability (increasing R'), an increase in the tendency toward earing (increase in delta R) must be tolerated. Therefore, a point must be established where the severity of earing (delta R) is more detrimental than the improvement in drawability (R').

AD-634 687 **Field 13H, 11F**
CFSTI Prices: HC$1.00 MF$0.50
Watervliet Arsenal, N. Y.
STRESS-AGING AND ITS EFFECTS ON TENSILE PROPERTIES OF SOME STAINLESS AND ULTRA-HIGH-STRENGTH STEELS,
by Richards H. Harrington. Jun 66, 15p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users. See also AD-631 422.

Descriptors: (*Aging (Materials), *Steel), (*Strainless steel, Aging (Materials)), Stainless steel, Tensile properties, Heat treatment.

Identifiers: Stress-aging, Stainless steel 17-7 PH, Stainless steel 17-4 PH, Stainless steel AM 355, Steel 4340, Steel 4335, Steel 300-M.

For abstract, see T 66 15.

ANL-6975 **Field 13H, 14B, 18J**
CFSTI Prices: HC$2.00 MF$0.50
Argonne National Lab., Ill.
VIBRATORY GRINDING AND POLISHING OF METALLOGRAPHIC SPECIMENS,
by S. Matras. Nov 65, 37p
Contract W-31-109-eng-38

Descriptors: (*Grinding, Vibrators (Mechanical)), (*Vibrators (Mechanical), Metallography).

NAA-SR-11739 **Field 13H, 18I**
CFSTI Prices: HC$3.00 MF$0.50
Atomics International, Canoga Park, Calif.
MODULAR STEAM GENERATOR FABRICATION,
by L. T. Bogaert. 1964, 47p
Contract AT (11-1)-GEN-8

Descriptors: (*Boilers, Welding), (*Heat exchanger, Boiler tubes).

N66-15241 **Field 13H**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
IN-FLIGHT TEST TO DETERMINE SPACE ENVIRONMENTAL EFFECTS ON FRICTION, WEAR, AND LUBRICATION OF MATERIALS,
by E. J. Devine, and H. E. Evans. 1965, 15p
NASA-TM-X-54967
Presented at the AIAA Ann. Meeting and Tech. Display (2nd), San Francisco, Jul 26-29 1965.

Descriptors: *Sliding friction, *Space environment, *Lubrication, *Wear.

PB-168 981 **Field 13H, 13M**
CFSTI Prices: HC$4.00 MF$1.00
Bureau of Yards and Docks, Washington, D. C.
SHEET METAL, STRUCTURAL IRON AND WELDING HANDBOOK. ENGINEERED PERFORMANCE STANDARDS PUBLIC WORKS MAINTENANCE.
Jul 65, 142p NAVDOCKS-P-713
PB-181 129-1 superseded

Descriptors: (*Maintenance, Handworks), (*Production control, Standards), Sheets, Iron, Steel, Welding, Material forming, Aluminum, Structural parts, Time.

PB-168 982 **Field 13H, 13M**
CFSTI Prices: HC$1.00 MF$1.00
Bureau of Yards and Docks, Washington, D. C.
SHEET METAL, STRUCTURAL IRON AND WELDING FORMULAS. ENGINEERED PERFORMANCE STANDARDS PUBLIC WORKS MAINTENANCE.
Jul 65, 144p NAVDOCKS-P-713.1
PB-181 130-1 superseded

Descriptors: (*Maintenance, Handbooks), (*Production control, Standards), Sheets, Iron, Welding, Material forming, Machine tools, Steel, Aluminum, Soldering, Structural parts, Time, Sheets.

RL-SEP-710 **Field 13H, 11F**
CFSTI Prices: HC$1.00 MF$0.50
General Electric Co., Richland, Wash. Hanford Atomic Products Operation.
PROGRAMMED TUBE TO TUBESHEET WELDING ON HANFORD HEAT EXCHANGERS USED IN NUCLEAR PROCESSING SERVICE,
by L. B. Bradley. Jan 66, 19p
Contract AT (45-1)-1851

Descriptors: (*Heat exchangers, Welding), (*Metal joints, Corrosion resistance).

AD-411 558 **See Field 9A**

AD-462 137 **See Field 21H**

AD-634 151 **See Field 9A**

AD-634 214 **See Field 9A**

AD-634 227 **See Field 13J**

AD-634 236 **See Field 5C**

AD-634 341 **See Field 12A**

AD-634 342 **See Field 12A**

AD-634 343 **See Field 11F**

AD-634 384 **See Field 11F**

AD-634 386 **See Field 9A**

AD-634 447 **See Field 9A**

AD-634 747 **See Field 11F**

AD-634 762 **See Field 9A**

ANL-7077 **See Field 18J**

ORNL-3510 **See Field 20M**

PB-169 974 **See Field 13J**

RMI-4 **See Field 18J**

Y-1508 **See Field 18J**

Y-1508 **See Field 18J**

13I. MACHINERY AND TOOLS

N66-15825 **Field 13I**
CFSTI Prices: HC$6.00 MF$1.25
Hughes Tool Co., Culver City, Calif.
PRELIMINARY DESIGN OF A GEOLOGIC SAMPLE ACQUISITION AND TRANSPORT DEVICE.
Final rept. May-Oct 65,
by R. O. Bredthauer, and W. T. Jones. Oct 65, 204
Contract NAS7-100
NASA-CR-69577

Descriptors: *Systems design, *Transport vehicle, *Geology, *Sampling device.

AD-634 680 See Field 19E

AD-634 694 See Field 16A

PB-169 903 See Field 11H

UCRL-14660 See Field 21E

13J. MARINE ENGINEERING

AD-461 697 Field 13J
CFSTI Price: HC$1.00
Ship Structure Committee, NAS-NRC, Washington, D. C.
BIENNIAL REPORT OF THE SHIP STRUCTURE COMMITTEE.
Rept. for 1 May 62-30 Oct 64,
by John B. Oren. 1 May 62, 20p

Descriptors: (*Ships, Construction), Reviews, Structural parts, Abstracts, Design, Scientific organizations, Materials.

AD-469 181 Field 13J
CFSTI Prices: HC$6.00 MF$1.25
Martin Co., Baltimore, Md.
HYDROFOIL SHIP STRUCTURAL DESIGN CRITERIA STUDY.
Final rept.
Feb 65, 246p ER-13727
Contract NObs-4791

Descriptors: (*Hydrofoil boats, Design), Loading (Mechanics), Analysis, Fatigue (Mechanics), Ship hulls, Ship structural components.

A study was made of environmental conditions and the corresponding vehicle response characteristics to develop a rational method for determining structural design criteria for hydrofoil ships. While the methods are relatively general, application is made to a specific 280-ton hydrofoil ship (similar to PCH) in ASW missions in the North Atlantic environment. It is concluded from the analysis of the structure that both static strength and fatigue life must be considered in the design of hydrofoil ship structure. In the particular example ship, design fatigue life is the determining factor for overall hull bending and local design of forward areas of the hull bottom while static strength or stiffness is of most importance on midship and after areas of the hull and the deck structure. Very low deadrise angles (5 to 6 degrees) lead to very large local pressures and high landing accelerations which may become critical for static strength determination of overall hull bending.

AD-634 227 Field 13J, 13H, 20K
CFSTI Prices: HC$2.00 MF$0.50
Naval Construction Research Establishment, Dunfermline (Scotland).
SMALL SCALE GRILLAGE TESTS,
by J. Clarkson. Feb 66, 35p NCRE/R.517, UNDEX-475

Descriptors: (*Ship structural components, Model tests), (*Loading (Mechanics), Ship structural components), Great Britain, Welding, Steel, Panels (Structural), Ship plates, Beams (Structural), Reinforcing materials, Stresses.

To investigate the possibilities of making smaller scale steel grillage models, two simple models were constructed in a high yield steel using the dip transfer gas shielded electrode method of welding. The models might be regarded as 1/3 or 1/4 scale, the thickness of material ranging from 0.15 to 0.27 in. A high standard of manufacture was achieved, with only very small welding distortions. The models were loaded elastically over the stiffeners, and into the elasto-plastic range over individual plate panels. Finally, the grillages were loaded to plastic collapse. For loadings over the stiffeners in both the elastic and plastic ranges, the results generally confirmed earlier work. For loadings applied to a plate panel, some surprisingly high local stiffener bending stresses were observed, which were attributed to very small effective breadths around the loaded panel, in the range 10 to 25% of the stiffener spacing. (Author)

AD-634 403 Field 13J, 11I
CFSTI Prices: HC$3.00 MF$0.50
Allied Research Associates, Inc., Concord, Mass.
A PHOTOELASTIC INVESTIGATION OF DEEP SUBMERGENCE WINDOWS.
Technical rept.,
by Robert Winter, and Herbert Becker. May 66, 54p ARA-315-7
Contract NObs-94102

Descriptors: (*Submarine hulls, Deep submergence), (*Plastics, Submarine hulls), Stresses, Acrylic resins, Marine engineering, Loading (Mechanics).

Identifiers: Windows.

Photoelastic investigations were conducted to determine stresses in 45 degree seat angle conical frustum plastic windows with diameter/thickness (d/h) ratios from 0.5 to 2.5 to embrace the range of current design (on Aluminant, Trieste, and Alvin vehicles, d/h = 0.54, 0.67, and 1.43 respectively). The results indicate that a window with d/h less than 1 may be used without significant tensile stresses occurring on the inner face. The effect of seat angle/window angle mismatch was found to have relatively little effect upon stress levels near the cone axis, although local concentrations at the periphery of the inner face were strongly affected. An important aspect of the study was the tentative identification of the physical nature of the window behavior as a conical sector of a pressurized hollow sphere interacting with a lens shaped cap. (Author)

AD-634 511 Field 13J
CFSTI Prices: HC$2.00 MF$0.50
David Taylor Model Basin, Washington, D. C. Structural Mechanics Lab.
STRUCTURAL RESPONSE OF A CARRIER MODEL IN REGULAR AND RANDOM WAVES.
Final research and development rept.,
by John N. Andrews, and Alfred L. Dinsenbacher. Apr 66, 36p
Proj. S-F013-03-01
Task 1973
DTMB-2177

Descriptors: (*Aircraft carriers, Model tests), (*Ocean waves, Ship hulls), Loading (Mechanics), Motion, Velocity, Analog computers, Dynamics, Mathematical analysis.

A segmented structural model of a carrier was tested in regular waves at various speeds, wavelengths, and wave heights. It was also tested at zero speed in random waves. Bending moments at three locations on the model together with motions and environment data were recorded. Response amplitude operators were derived from regular wave tests and were compared with response amplitude operators derived from the random wave test. The comparison showed excellent agreement. The data were also compared with analog computer results and this comparison was satisfactory. (Author)

AD-634 560 Field 13J
CFSTI Prices: HC$2.00 MF$0.50
David Taylor Model Basin, Washington, D. C. Hydromechanics Lab.
GENERAL RESISTANCE TEST OF A SHALLOW STEP PLANING HULL WITH APPLICATION TO A HYDROFOIL CONFIGURATION.
Final rept.,
by Lawrence Benen. May 66, 41p
Proj. S-4606X
Task 1707
DTMB-2169

Descriptors: (*Hulls (Marine), Planing surfaces), (*Hydrofoils, Model tests), Configuration, Stability, Loading (Mechanics), Afterbodies, Lift, Drag.

General resistance tests of TMB Model 4335-2, a shallow-stepped planing hull, were conducted. This hull is the second in a series of planing hulls to be tested by the general resistance method to determine its suitability for use as a hydrofoil hull. Resistance, trimming moment, and wetted length were measured for several load, trim, and speed conditions. All data are presented in nondimensional form for use in comparing hull forms. The tests showed that the model has high resistance and is unstable due to afterbody wetting at certain combinations of trim, speed, and load conditions that might be encountered at some time during takeoff and landing. The high resistance and instability appear to be the result of spray interference and step ventilation problems. (Author)

AD-634 730 Field 13J, 20D
CFSTI Prices: HC$3.00 MF$0.75
Southwest Research Inst., San Antonio, Tex. Dept. of Mechanical Sciences.
AN EXPERIMENTAL PARAMETER STUDY OF THE FLUID FORCE AND MOMENT RESPONSE OF TWO TYPICAL SHIP ROLL STABILIZATION TANKS.
Technical rept.,
by John F. Dalzell. Feb 66, 60p TR-2
Contract Nonr-3926 (00)
Projs. S-R009-01-01, SwRI-02-1268

Descriptors: (*Ballast tanks, Performance (Engineering)), (*Ships, Ballast tanks), Fluid mechanics, Roll, Stabilization systems, Rotation, Force (Mechanics), Moments, Mathematical models.

In the course of a continuing study of the internal fluid dynamics of free-surface ship-roll stabilization tanks, a lack was noted of systematic experimental information combining the effects of tank distance from center of rotation, excitation amplitude and fluid depth for either the 'rectangular' type tank or the 'H' type. The purpose of the report is to present data obtained in an experimental study aimed at supplying a portion of this missing systematic information for two typical tank geometries. Those data which could be compared with previously obtained data appear in quantitative agreement within experimental accuracy. The data also appear to be qualitatively self-consistent and suitable for use in verification of improved analytical representations of the tank fluid dynamics. (Author)

AD-634 731 Field 13J, 20D
CFSTI Prices: HC$3.00 MF$0.75
Southwest Research Inst., San Antonio, Tex. Dept. of Mechanical Sciences.
INITIAL DEVELOPMENT OF A NONLINEAR MECHANICAL MODEL FOR THE MOMENT RESPONSE OF FREE-SURFACE ROLL STABILIZATION TANKS.
Technical rept.,
by John F. Dalzell. Mar 66, 69p TR-3
Contract Nonr-3926 (00)
Projs. S-R009-01-01, SwRI-02-1268

Descriptors: (*Ballast tanks, Models (Simulations)), (*Ships, Ballast tanks), Moments, Stabilization systems, Roll, Fluid dynamic properties.

The report outlines the development of a nonlinear mechanical model for the moments exerted on the ship by the fluid contained in the free-surface roll stabilization tank. Though it is not clear that the current model is the best that can be achieved, the correlation demonstrated in the report between the current mechanical model and experimental results is comparable with that obtained in the aerospace industry between experimental results for cylindrical tanks and the corresponding linear me-

chanical models utilized in control system analyses. The development of a mechanical model represents a pragmatic approach to the effects on the ship of the hydrodynamic phenomena under investigation, and cannot be as meaningful as a rigorous nonlinear hydrodynamic theory. Nevertheless, it is concluded that with some additional study the current mechanical model could turn out to be a very useful concept for rationalization of bench test data, and perhaps ultimately for the study of coupled ship-tank dynamics and optimization of tank design. (Author)

PB-169 955 **Field 13J**
CFSTI Price: HC$2.60
David Taylor Model Basin, Washington, D. C. Hydromechanics Lab.
OPEN-WATER TESTS OF A LOW PITCH THREE-BLADED PROPELLER SERIES IN A NOZZLE,
by B. V. Nakonechny. Jul 59, 24p Rept. no. 1338
AD-224 564

Descriptors: (*Propellers (Marine), Tests), Nozzles, Reynolds number, Thrust, Hydrodynamics.

Open-water tests of a low pitch three-bladed propeller series in a nozzle were conducted at Reynolds numbers from 0.70 to 1.24 x 10 to the 6th power for a range of speeds from zero to the speed for zero thrust. The results of the tests are presented in the form of series diagrams for the 'propeller plus nozzle' system. (Author)

PB-169 974 **Field 13J, 11F, 20K, 13H**
CFSTI Price: HC$3.60
Ship Structure Committee, NAS-NRC, Washington, D. C.
INFLUENCE OF STEEL-MAKING VARIABLES ON NOTCH TOUGHNESS,
by J. H. van der Veen. 27 Jun 60, 39p SSC-128
AD-239 049
Prepared for presentation at Committee on Ship Steel meeting (annual) March 1960. Prepared in cooperation with Royal Netherlands Blast Furnaces and Steelworks Ijmuiden (Holland).

Descriptors: (*Ship plates, Steel), (*Steel, Notch toughness), Sheets, Fracture (Mechanics), Processing, Chemical analysis, Thickness, Temperature, Rolling mills, Oxygen, Deoxidation (Metallurgy), Manufacturing methods.

The influence of various processing factors on the notch toughness of mild-steel plates is discussed. The variables include (1) chemical analysis (especially Mn and C content), (2) plate thickness, (3) finish-rolling temperature (controlled-rolling practice), (4) deoxidation (semikilled or Al-killed), (5) normalizing, and (6) cross rolling. (Speech presented at the annual meeting of the Committee on Ship Steel, March 1960).

AD-465 025 **See Field 13H**

AD-634 202 **See Field 20A**

AD-634 203 **See Field 20A**

AD-634 319 **See Field 20D**

AD-634 330 **See Field 20D**

AD-634 475 **See Field 9A**

AD-634 601 **See Field 13A**

AD-634 719 **See Field 11D**

AD-634 747 **See Field 11F**

NLCO-954 **See Field 11F**

13K. PUMPS, FILTERS, PIPES, FITTINGS, TUBING, AND VALVES

AD-634 594 **Field 13K, 14B**
CFSTI Prices: HC$1.00 MF$0.50
Illinois Univ., Urbana. Coordinated Science Lab.
PUMPING SPEED OF GETTER-ION PUMPS AT LOW PRESSURES,
by Andras Dallos, and Fortunat Steinrisser. Jun 66, 18p R-302
Contract DA-28-043-AMC-00073 (E), Grant NsG-376
Proj. DA-20014501B31F

Descriptors: (*Vacuum pumps, Velocity), Low-pressure research, Performance (Engineering), Degasification, Ions.

Identifiers: Ion getters.

Pumping speeds of commercial diode and triode type getter-ion pumps were measured for the gases H2, He, and N2 over the pressure range from about 10 to the minus 11th power Torr to 0.000001 Torr. At 10 to the minus 10th power Torr, the pumping speed was 15-25% of the speed at 0.000001 Torr where the pumps attained the rated speed. Pumping speed measurements as a function of time showed that the pumping speed decreased generally only slightly over a period of one day. Strong saturation was found only for He at pressures above 10 to the minus 7th power Torr. No significant difference between diode and triode in the pumping speed vs. time or vs. pressure curves was observed. In the diode, pump currents were measured. The quantity P.S/I (P = pressure, S = pumping speed, and I = current) was found to be pressure independent for short pumping times. The numbers (in molecules or atoms pumped per charge) are: 0.5 (H2), 0.6 (He), and 0.2 (N2). (Author)

AD-634 656 **See Field 20K**

13M. STRUCTURAL ENGINEERING

AD-427 305 **Field 13M, 13G**
CFSTI Price: HC$19.00
Aircraft Armaments, Inc., Cockeysville, Md.
RAPID EMPLACEMENT AND RETRIEVING DEVICE FOR GROUND STAKES SP-112/G AND GP-113/G.
Summary rept.,
by R. G. Strickland, and C. Gonnerman. 15 Jan 64, 186p ER-3246
Contract DA-36-039-sc-90760 (E)

Descriptors: (*Anchors (Structural), Military engineering), (*Drilling machines, Soils), (*Hammers, Soils), (*Soils, Military engineering), Explosive actuators, Shaped charges, Pneumatic devices, Ballistics, Rocket motors, Permafrost, Load distribution, Designs, Impact shock, Stresses, Exhaust pipes, Penetration, Recovery, Deflection, Mechanical properties, Human engineering, Tests, Drills.

Identifiers: Ballistic hammers.

This report describes the development of an emplacement-retrieve mechanism which would be fast acting, lightweight, effective in all soils, and be simple to operate and maintain. The fact that the site chosen for erection is dictated by the tactical situation rather than soil conditions makes it necessary that the emplacement-retrieve device be capable of operating where conventional techniques fail. This program was concerned with the selection of an approach which had the greatest potential to satisfy system requirements and then developing the item to demonstrate the feasibility of the approach selected. A wide range of devices such as explosive shaped charges, rocket devices, recoilless launchers, impact hammers, ballistic tools and vibratory drivers were evaluated and a ballistic hammer selected as having the greatest potential for development. A design for this device was evolved, based upon analytical considerations and results of tests with a firing mockup. A model was constructed. The performance of a ballistic hammer was evaluated in a series of tests. (Author)

AD-634 140 **Field 13M, 11F**
CFSTI Prices: HC$2.00 MF$0.50
Lockheed Missiles and Space Co., Palo Alto, Calif. Research Labs.
WEIGHT SAVINGS DERIVED FROM THE USE OF CONTRASTING MATERIALS IN CONVENTIONALLY STIFFENED CYLINDERS,
by A. Bruce Burns. May 66, 37p Rept. no. 6-76-66-2

Descriptors: (*Stiffened cylinders, *Weight), (*Materials, Stiffened cylinders), Beryllium alloys, Beryllium, Aluminum alloys, Aluminum.

A nondimensionalized structural optimization procedure is used to determine the effect on weight of specifying contrasting ring, stringer, and wall materials in J-stiffened, axially compressed cylinders. For conventional materials having modulus-to-density ratios of approximately 10 to the 8th power in., lighter elastic designs result when less dense materials are introduced anywhere in the design. Weight savings are proportional to the percentage of the lighter material used. However, since low-density materials usually have relatively low strengths, these materials are not efficient in plastic designs. Two nonconventional materials, beryllium and beryllium-38% aluminum, are studied in combination with aluminum. Aluminum rings may be used in otherwise beryllium or beryllium-38% aluminum designs with small weight penalties. At low loads, weights of designs with aluminum stringers and a beryllium or beryllium-38% aluminum wall, or vice versa, are about midway between the weights for all-aluminum and all-beryllium designs. At high loads, results depend heavily upon strength-density ratios. (Author)

AD-634 495 **Field 13M**
CFSTI Prices: HC$3.00 MF$0.75
Michigan Univ., Ann Arbor. Dept. of Civil Engineering.
BEHAVIOR AND MAXIMUM STRENGTH OF METAL COLUMNS.
Interim rept.,
by Richard H. Batterman, and Bruce G. Johnston. May 66, 68p Rept. no. 05154-2-T
Contract NBy-45819
Proj. ORA-05154

Descriptors: (*Loading (Mechanics), *Structural parts), Steel, Aluminum alloys, Digital computers, Programming (Computers), Stimulation, Deformation, Stresses, Deflection, Grafics.

Identifiers: Columns (Structural).

By means of digital computer simulation the complete load-deformation history of a column was obtained. About one thousand simulation column tests provided a basis to establish systematically the maximum strength and study the behavior of both straight and initially crooked columns for various yield point steels and a typical aluminum alloy. The effects of residual stress, alone or in combination with initial crookedness, are systematically evaluated for steel columns. (Author)

AD-634 738 **Field 13M, 13B, 19D**
CFSTI Prices: HC$2.00 MF$0.50
Explosiform, Inc., Forest Park, Ill.
AN OPTIMIZATION STUDY OF AN EXPLOSIVE-DRIVEN PILE.
Special rept.,
by Jacob Savitt. Apr 66, 46p
Contract DA-27-021-eng-5
CRREL-SR-99

Descriptors: (*Supports, Penetration), (*Pipes, Propulsion), (*Explosive materials, Thrust), Optimization, Steel, Geometric

forms, Design, Detonations, Soils, Underground structures, Cylindrical bodies.

Identifiers: Piles (Structural).

The propulsion of metals by the detonation of explosives in direct contact with them and propulsion effectiveness of various explosives for such purposes was studied. The results of these studies were applied to the design and evaluation of explosives systems for pile driving. It was determined that piles with external grooves along their entire lengths which are driven by the detonation of high explosives upon the lips of these grooves are not as effectively propelled as those which are driven by explosive 'hammerheads' on top of the piles. The results indicate that long, heavy-walled steel piles may successfully be driven into ordinary and frozen ground by the appropriate design and use of such explosive hammerhead systems. (Author)

AD-634 675 See Field 20K

AD-634 691 See Field 18C

BNWL-208 See Field 13B

PB-168 981 See Field 13H

PB-168 982 See Field 13H

PB-170 735 See Field 13B

14A. COST EFFECTIVENESS

AD-634 200 **Field 14A, 5A**
CFSTI Prices: HC$1.60 MF$0.50
Rand Corp., Santa Monica Calif.
DECISION MAKING FOR PUBLIC INVESTMENT: DISCUSSION,
by J. W. Milliman. 15 Jan 61, 14p P-2252

Descriptors: (*Decision making, *Costs), Optimization, Scheduling, Natural resources.

The report presents a critique on 'Welfare Aspects of Benefit-Cost Analysis,' by John M. Krutilla, and 'Water and Welfare,' by Robert Dorfman. In the light of these papers it comments on the RAND-sponsored study Water Supply: Economics, Technology, and Policy by Hirshleifer, De Haven, and Milliman (University of Chicago Press, 1960). (Author)

AD-634 512 **Field 14A, 15G**
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
THE ANALYTICAL BASES OF SYSTEMS ANALYSIS,
by G. H. Fisher. May 66, 19p P-3363
Presented at a symposium on Systems Analysis in Decision-Making sponsored by the Electronics Industries Association, held at the Institute for Defense Analyses, Washington, D. C., June 23, 1966.

Descriptors: (*Decision making, *Systems engineering), (*Armed forces operations, Optimization), Operations research, Cost effectiveness, Management planning, Uncertainty.

Identifiers: Systems analysis.

The role of systems analysis is discussed in the context of decision making by the military in making long-range plans. The desire is for systems analysis to assist the decision maker so that his intuition and judgment are better than they would have been without the results of the analysis. One example given is for analysis to provide a solution in a short time in a complex situation. One solution is to develop summary analyses of cost and utility and to present them along with a qualitative statement of some of the key implications. A diagram shows the total system cost vs force size (number of ready missiles) for alternative systems, while a table shows the selected data bearing on the utility considerations for the alternative systems. System cost includes research and development, investment, and operating cost. The alternatives include ground-based missile systems and airborne-alert, long-endurance-aircraft systems, with the aircraft serving as missile-launching platforms. Such a technique is postulated to be of value in instances of uncertainty where optimization is desired.

AD-634 196 See Field 5A

AD-634 243 See Field 1C

AD-634 389 See Field 5A

AD-634 739 See Field 14D

14B. LABORATORIES, TEST FACILITIES, AND TEST EQUIPMENT

AD-294 869 **Field 14B, 14E**
CFSTI Price: HC$4.00
GM Defense Research Labs., Santa Barbara, Calif. Aerospace Operations Dept.
INSTRUMENTATION, CALIBRATION, AND DATA REDUCTION METHODS.
Technical rept.
by W. L. Koch. Dec 62, 197p TR62-213
Contract DA-04-495-ORD-3567, ARPA Order-347-62

Descriptors: (*Instrumentation, Data), (*Calibration, Instrumentation), Hypervelocity guns, Spark shadowgraph photography, Kinetic theory, X ray photography, Schlieren photography, Infrared radiation, Microwaves, Doppler radar.

This Instrumentation Report has been prepared with several purposes in mind. First, a thorough description of the Flight Physics Range instrumentation is necessary because the majority of data are in the form of photographic records made with spark illumination of the model or taken directly from oscilloscope traces. Thus, in order to interpret these photographic records, a thorough understanding of the apparatus is required. The second purpose is to establish a basis for the reduction of raw photographic data as presented in our data reports, Volumes I - VI. This reduction requires a presentation of mathematical methods as well as the constants needed for the computations. Finally, calibration methods of the various instruments and of the entire flight trajectory need to be presented in order to establish the accuracy and reliability of the data. For these reasons, this report should be considered a handbook, covering such fields as flight kinematics, optical radiation, microwave phase shift and attenuation, and doppler radar return. It is written as a series of descriptions by investigators who are experts in their respective fields.

AD-436 042 **Field 14B, 9C**
CFSTI Price: HC$3.00
Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
RADIO FREQUENCY COMPATIBILITY (RFC) ACCESSORY EQUIPMENT SET.
Quarterly rept. no. 3, 15 Oct 63-15 Jan 64,
by H. W. Denny, W. R. Free, and J. R. Wales Jr. 15 Jan 64, 51p
Contract DA-36-039-AMC-02223 (E)
Projs. DA-1G620501D449, A-693

Descriptors: (*Test sets, Compatibility), (*Radiofrequency, Compatibility), Measurement, Test equipment, Electric filters, Attenuators.

A discussion is presented of several of the items of equipment necessary in a radio frequency compatibility accessory equipment set designed for performing measurements as specified in military specification MIL-I-11748. Major items discussed are the frequency measurement system and a standard response indicator for both CW and pulse systems. The specifications for other accessory items such as directional couplers, isolators, attenuators, dummy loads, and filters are also reviewed. Experimental work on the deposition of thin film alloys to obtain a film with a temperature coefficient of resistance which exhibits a minimum change of resistance over the temperature range of interest was conducted. Results of this work are shown. A receiver input coupler which provides for coupling from 50 to 300 ohm transmission systems was designed and its characteristics are shown. The problems associated with the audio susceptibility tester are discussed. Results of the evaluation of a rejection filter operating in the frequency range 100 to 400 Mc are presented. (Author)

AD-447 153 **Field 14B, 1A**
CFSTI Price: HC$2.60
Naval Ordnance Lab., White Oak, Md.
NOL HYPERSONIC SHOCK TUNNEL FACILITIES.
by J. W. Watt, and P. M. Aronson. Dec 63, 29p
Ballistic Research-120, NOLTR-63-259
N64-31670

Descriptors: (*Hypersonic wind tunnels, Design), (*Shock tubes, Hypersonic characteristics), Performance (Engineering), Instrumentation, Test facilities.

This report includes a description of the capabilities and the limitations of the NOL Hypersonic Shock Tunnel facilities presently in operation, and a discussion of some of the associated instrumentation used with these facilities. (Author)

AD-448 220 **Field 14B**
CFSTI Price: HC$5.60
Naval Ordnance Lab., White Oak, Md.
NOL HYPERSONIC TUNNEL NO. 4.
by James E. Danberg, Robert T. Schroth, Ada P. Jackson, and Francis W. Brown. 29 Jun 64, 59p
NOLTR-62-47, Aerodynamics research-176
N64-31668

Descriptors: (*Hypersonic wind tunnels, Hypersonic characteristics), Design, Test facilities, Instrumentation, Operation, Performance (Engineering).

NOL's Hypersonic Tunnel No. 4 is a continuous blow-down hypersonic tunnel designed for research and development testing of models, instrumentation, and wind tunnel components. It can operate at Mach numbers from 5 to 10 with supply pressures up to 52 atmospheres and supply temperatures up to 1700 R. This report summarizes the pertinent aerodynamic design criteria and operating experience compiled during its first eleven years of operation. Included are descriptions of the major components and their performance along with the flight simulation capability of the facility and a bibliography of previously published reports. (Author)

AD-450 999 **Field 14B, 18C**
CFSTI Price: HC$2.60
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
INVESTIGATION OF USE OF ACCELEROMETERS FOR TRANSIENT DISPLACEMENT MEASUREMENTS,
by R. F. Runko. Sep 64, 24p Miscellaneous paper-1-672

Descriptors: (*Accelerometers, Explosion effects), (*Shock (Mechanics), Accelerometers), (*Nuclear explosions, Explosion effects), Measurement, Blast, Structures, Motion, Integration, Instrumentation, Mathematical analysis.

This report describes numerical integration techniques which were applied to transient acceleration records at the Waterways Experiment Station. The methods studied were the trapezoidal,

Simpson's, and Weddle's rules. Results of tests described in this report indicated that the trapezoidal rule was superior to the others for the type of transient acceleration records studied. Appendix A describes a theory for developing a new shock-measuring instrument, formulated by W. P. Welch. Appendix B contains some notes on the interesting technique proposed by Welch. (Author)

AD-455 149 **Field 14B, 20D, 1A**
CFSTI Price: HC$3.60
David Taylor Model Basin, Washington, D. C. Aerodynamics Lab.
PRELIMINARY ESTIMATES OF THE TEST-SECTION CHARACTERISTICS IN A HIGH-ENTHALPY, LOW-DENSITY WIND TUNNEL,
by John R. Krouse. Sep 64, 31p Rept. no. 1921, Aero-1076

Descriptors: (*Hypersonic wind tunnels, Aerodynamics), (*Aerodynamics, Hypersonic wind tunnels), Gas flow, Plasma physics, Thermodynamics.

Preliminary estimates are obtained of the test-section characteristics in a high-enthalpy, low-density wind tunnel. The initial stagnation conditions are assumed to be a temperature of 9000 R and atmospheric pressure; the steady, one-dimensional, inviscid, adiabatic expansion is terminated at 0.00001 atmosphere. Air is used as the working medium. The computations are performed for both equilibrium and frozen flow processes, thus enabling a physical appreciation for the comparative behavior of the two extremes which serve as upper and lower limits on any non-equilibrium behavior. The variables that are evaluated include the significant physical, thermodynamic, and transport properties, in addition to some of the more important dimensionless aerodynamic similarity parameters, all of which are presented graphically as a function of nozzle static pressure. It is demonstrated that the test-section characteristics depend to a considerable degree on the governing flow process.

AD-477 649 **Field 14B, 20D, 7D**
CFSTI Prices: HC$2.00 MF$0.50
Virginia Univ., Charlottesville.
A HIGH-TEMPERATURE OSCILLATING-DISK VISCOMETER.
Technical rept.,
by R. DiPippo, J. Kestin, and J. H. Whitelaw Jan 66, 43p BRN-17-P
Contract Nonr-3623 (00)
Proj. NR-098-038
Prepared in cooperation with Brown Univ., Providence, R. I.

Descriptors: (*Nitrogen, Viscosity), (*Viscosimeters, Design), (*Gases, Viscosity), High-temperature research, Discs, Oscillation, Thermal expansion, Quartz, Drawing (Machine processing).

Identifiers: Squid project.

The paper describes a new, high-precision, oscillating-disk viscometer in which it is possible to make absolute determinations of the viscosity of gases at atmospheric pressure in a temperature range 20 - 950C, approximately. The effect of differential thermal expansion on the spacing between the disk and the fixed plates as well as that of high internal damping in the wire, both of which precluded the use of this method at high temperatures in the past, was eliminated by making all such parts, including the suspension strand, of fused quartz. This was made possible by a novel method of drawing the strand. Estimates of precision and tests of reproducibility suggest that the measurements are accurate to plus or minus 0.1%. Preliminary results on pure nitrogen up to 500C are presented. Excellent agreement with the most reliable determinations, which are available up to 75C, is obtained, thus inspiring confidence in the results at higher temperatures. (Author)

AD-478 166 **Field 14B**
CFSTI Prices: HC$3.00 MF$0.75
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
PROPULSION RESEARCH LABORATORY SUMMARY REPORT FOR FY 1965.
Annual progress rept. 1 Oct 63-30 Sep 64,
by H. L. Olsen, W. T. Baker, and E. A. Bunt. Sep 64, 67p TG-734
Contract NOw-62-0604-c

Descriptors: (*Propulsion, Test facilities), (*Test facilities, Propulsion), Wind tunnels, Design, Construction, Safety, Research program administration, Combustion, Ramjet engines, Atmosphere entry, Noise generators, Rocket motors.

The APL Propulsion Research Laboratory constitutes a versatile blowdown facility for the implementation of exploratory development of advanced propulsion systems. Because of its ability to simulate the environmental conditions of high-speed flight, the facility has also been extended to implement experiments on ablation, heat transfer, and wake studies associated with missile re-entry. The report includes information on facility utilization, fiscal consideration, design and fabrication, facility additions and alteration, safety, administrative, facility development, publications by BPF staff, technical projects active during the year.

AD-634 218 **Field 14B**
CFSTI Prices: HC$1.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
LOW RESOLUTION LENGTH MEASUREMENT BY A SIMPLE DIGITAL METHOD.
Technical rept.,
by H. W. P. Knapp. Dec 65, 19p TR-65267

Descriptors: (*Digital systems, Measurement), Measuring devices (Electrical ; electronic), Great Britain.

A photodiode controlled digital encoder giving a low resolution measurement of length is described. The principle is demonstrated by considering the design of Gray, binary and binary-coded-decimal encoders. (Author)

AD-634 235 **Field 14B, 20F, 7D**
CFSTI Prices: HC$2.00 MF$0.50
Boeing Scientific Research Labs., Seattle, Wash. Geo-Astrophysics Lab.
A NEW TYPE OF LOW-RESOLUTION MASS SPECTROMETER,
by I. E. Dayton, J. M. Saari, and R. I. Schoen. Mar 66, 37p D1-82-0508
Also available from the author. Prepared in cooperation with Montana State Univ., Bozeman, Dept. of Physics.

Descriptors: (*Spectrum analyzers, *Mass spectroscopy), Ionization, Resolution, Design, Electrons, Photons.

A pulsed, low-resolution, slitless mass spectrometer of a new type is discussed. Mass analysis is achieved by scanning the energies of ions which have been given equal momentum increments. The chief advantage of the design lies in the large ionization volume available. The possibility of using this kind of mass spectrometer for photoionization, ion-molecule reaction and energetic ion studies is pointed out. Mass spectra obtained by electron ionization and photoionization are presented. Resolution of at least one mass unit in 15 is demonstrated and a sensitivity of 3 amp/ (amp Torr) for electron ionization in nitrogen is shown. (Author)

AD-634 284 **Field 14B, 8B, 8E**
CFSTI Prices: HC$1.00 MF$0.50
Army Foreign Science and Technology Center, Washington, D. C.
EXHIBITION OF CONTEMPORARY GEODETIC AND PHOTOGRAMMETRIC INSTRUMENTS,
by S. P. Shokin. Jun 66, 21p FSTC-HT-23-93-66
Proj. 2301-6553
TT-66-61500
Trans. of mono. Geodeziya i Kartografiya, Moscow, 1965 p3-17.

Descriptors: (*Instrumentation, *Geodesics), (*Photographic equipment, *Photogrammetry), Aerial cameras, Photographic processors, Theodolites, Surveying, USSR, Photographic projectors, Gravity, Meters.

One hundred and twenty geodetic and photogrammetric instruments developed in the USSR, Bulgaria, Hungary, and East Germany in 1962-1965 were exhibited at Moscow from 15 September to 5 October 1965. The exhibits included aerial cameras, instruments for processing aerial photographs and compiling maps from aerial photographic surveys, gravimetric instruments, and instruments for measuring angles, distances, and relative altitudes on the Earth's surface. Descriptions and illustrations of a number of these instruments are given. (Author)

AD-634 290 **Field 14B, 9C**
CFSTI Prices: HC$2.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
A MULTI-LEVEL COUNTING EQUIPMENT FOR ANALYSING ELECTRICAL SIGNALS.
Technical rept.,
by T. D. Reed. Dec 65, 36p TR-65297

Descriptors: (*Test equipment, Counting methods), (*Counting methods, Signals), Multiple operation, Statistical functions, Circuits, Analysis, Analog systems, Data, Electric currents, Great Britain.

This equipment is suitable for the analysis of random analogue data. Twenty amplitude levels may be pre-set about the mean level of the input signal and the crossings of these threshold levels are counted. In addition the amplitude probability distribution of the signal can be measured. Some measurements of a pseudo-random signal, obtained by low-pass filtering of a digital code are described. (Author)

AD-634 430 **Field 14B, 7D, 20F**
CFSTI Prices: HC$1.00 MF$0.50
Noyes Chemical Lab., Univ. of Illinois, Urbana.
ELECTRON GUN PERFORMANCE USING A MODIFIED APPEARANCE POTENTIAL TECHNIQUE.
Research rept.,
by G. Sanzone. Apr 66, 13p RR-4
Grant AF-AFOSR-588-64
AFOSR-66-0955

Descriptors: (*Mass spectroscopy, *Electron guns), Ionic current, Ionization, Measurement, Control systems, Performance (Engineering).

A modified retarding potential difference technique was applied to the electron gun of a time-of-flight mass spectrometer. Performance of the electron gun is described and the controls used are presented schematically. A method is suggested for testing precision of appearance and ionization potential measurements. (Author)

AD-634 504 **Field 14B, 13A**
CFSTI Prices: HC$3.00 MF$0.75
Ballistic Research Labs., Aberdeen Proving Ground, Md.
ELECTRIC AIR HEATER FOR SUPERSONIC WIND TUNNELS.
Technical note,
by Ernest P. Reklis. Sep 65, 89p BRL-TN-1599
Proj. RDT/E-1P222901A201

Descriptors: (*Supersonic wind tunnels, *Heaters), Air, Heating elements, Temperature control, Thermostat, Electrical equipment, Specifications, Maintenance.

In the hypersonic wind tunnel air cycle, the electric air heater is used as a vernier temperature control for heated air prior to the time that it enters the settling section. This report describes the air heater and may also serve as an operating manual. Appendices contain specifications, maintenance instructions and design information. (Author)

AD-634 509 **Field 14B, 20D**
CFSTI Prices: HC$1.00 MF$0.50
Harry Diamond Labs., Washington, D. C.
USE OF IONIZATION AND THIN-FILM PROBES TO LOCATE SHOCK FRONTS IN A PRESSURE-DRIVEN SHOCK TUBE,
by Harry A. Gieske. Apr 66, 24p TR-1321
Projs. DA-1P014501B11A, HDL-38100

Descriptors: (*Shock waves, *Probes), Gas ionization, Films, Measurement, Air, Argon, Electronic equipment.

The usefulness of ionization probes and thin-film probes for locating shock fronts in air and in argon was determined for the test conditions of 8 < or ± Ms < or ± 11 and 2 < or ± p sub i < or ± 20 mm Hg, where Ms is the shock Mach number and p sub i is the initial pressure in the shock tube. With the probes located in the field of view of a Kerr cell shuttered shadowgraph, the shock front-to-probe distance was correlated with the probe output by displaying the Kerr cell shuttered pulse and the probe signal on the same oscilloscope trace. The results show that the thin-film probe is superior to the ion probe for locating the shock front, there being a small variation in signal delay time of approximately 0.2 microsec for the thin film while the ion probe delay time varied from 0.2 to 3.0 microsec, depending upon test conditions and test gas. (Author)

AD-634 592 **Field 14B**
CFSTI Prices: HC$1.00 MF$0.50
Illinois Univ., Urbana. Coordinated Science Lab.
AN EVALUATION OF A BAKEOUT PROCEDURE FOR SMALL GLASS ULTRAHIGH VACUUM SYSTEMS,
by Fortunat Steinrisser. Jun 66, 17p R-299
Contract DA-28-043-AMC-00073 (E), Grant NsG-376
Proj. DA-20014501B31F

Descriptors: (*Vacuum apparatus, Performance (Engineering)), Glass, Low-pressure research, Heating, Diffusion pumps, High vacuum values, Degasification.

A bakeout procedure for small glass ultrahigh vacuum systems is described which insures pressures well below 10 to the minus 11th power Torr. An optically dense zeolite trap and a valve were placed between diffusion pump and system. The trap was baked whenever it was loaded with gas, i.e., after glassblowing, system bakeout, and outgassing of the ion gauges. The valve between trap and system was kept closed during bakeout of the trap. During bakeout of the system, outgassing of the ion gauges, and regular operation of the system, the trap was refrigerated at liquid nitrogen temperature. The observed partial pressures are given. Atmospheric He diffusing through the Pyrex glass and H2 diffusing out of metal parts were the dominant residual gases. CO production during O2 admission was small in comparison to processing without use of the isolation valve. (Author)

AD-634 686 **Field 14B**
CFSTI Prices: HC$1.00 MF$0.50
Ballistic Research Labs., Aberdeen Proving Ground, Md.
PRECISION OF MEASUREMENT, ACCURACY AND PROCEDURES FOR DETECTING OUTLYING OBSERVATIONS,
by Frank E. Grubbs. Jun 66, 15p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Calibration, Errors), Tolerances (Mechanics), Measurement, Standards, Instrumentation.

Identifiers: Metrology.

For abstract, see T 66 15.

AD-634 699 **Field 14B**
CFSTI Prices: HC$2.00 MF$0.50
David Taylor Model Basin, Portsmouth, Va. Underwater Explosions Research Div.
ANALYSIS AND HIGH FREQUENCY CORRECTION OF BAR-MAGNET VELOCITY-METER RESPONSE.
Research and development rept.,
by J. D. Gordon. Apr 66, 30p
Task DASA-NWET/TID-B5.01
DTMB-2187
See also AD-621 788, AD-630 115.

Descriptors: (*Velocity, Measurement), (*Meters, Velocity), Corrections, Integral transforms, Shock waves, Transducers, Distortion, Analog systems, Resonance, Damping, Magnets.

The output of the bar-magnet velocity meter, used to measure ship and model structural velocity transients due to the shock of an underwater explosion, is distorted by the electrical and structural characteristics of the meter. This report contains a derivation and analysis of the velocity-meter transfer function by treating the meter distributed mechanical system with Laplace transform techniques. The output signal distortion due to the high frequency structural resonances of the transducer is discussed. A practical way of compensating for this distortion is developed and demonstrated with an analog computer study. Conclusions drawn on theoretical grounds are then verified by tests on an actual velocity meter. The correction method derived is particularly well suited for use with analog computational procedures. (Author)

NBS-TN-287 **Field 14B**
CFSTI Prices: HC$0.25 MF$0.50
National Bureau of Standards, Washington, D. C.
DISCLOSURES ON MAGNETIC TAPE HANDLER, FOCUS DETECTOR, MULTI-PEN RECORDER, SIGNAL AVERAGING FILTER, ELECTROSTATIC RMS VOLTMETER, BACK-UP RING FOR O-RINGS, AND LOW TEMPERATURE SOLID STATE THERMOMETER.
Technical note,
by David Robbins, and Alvin J. Englert. 8 Apr 66, 33p
Available from Superintendent of Documents, GPO, Washington, D. C., 20402, $0.25.

Descriptors: (*Voltmeters, Design), (*Magnetic tape, Instrumentation), (*Focusing, Detectors), (*Recording systems, Design), (*Temperature sensitive elements, Silicon), (*Metal seals, Design), Images, Filters (Electromagnetic wave), Optical equipment components, Thermometers, O-rings.

The booklet presents descriptions and drawings of seven devices, embodying interesting and unusual solutions to problems frequently encountered in their respective fields: a high speed magnetic tape handler, an electro-optical focus detector for a point light image, a multi-pen recorder having a time delay arrangement, a multi-segment signal averaging filter, an arrangement for measuring low temperatures using a silicon radiation detector, a high pressure back-up ring for O-rings, and an electrostatic RMS voltmeter. (Author)

N66-14578 **Field 14B**
CFSTI Prices: HC$1.00 MF$0.50
RCA Service Co., Inc., Camden, N. J. Nuclear and Scientific Services Dept.
A LARGE ULTRA HIGH VACUUM ENVIRONMENTAL CHAMBER WITH LIQUID HELIUM COOLED WALLS,
by J. M. Bradford, and C. D. Elderkin. 1965, 21p
Contract NAS1-1918 (C)
NASA-CR-69090
Presented at Inst. of Environ. Sci. 1965 Tech. Meeting and Equipment Exposition, 21-23 Apr 1965.

Descriptors: *Environmental chamber, *Space simulator, *Liquid helium, *Ultrahigh vacuum.

For abstract, see T 66 15.

PB-169 989 **Field 14B, 9C**
CFSTI Prices: HC$1.60 MF$0.50
Autonetics, Anaheim, Calif.
PULSE GENERATOR MODEL B7-B (RUTHERFORD ELECTRONICS).
Technical Manual instrument calibration procedure, AG-98.
1 Jan 66, 18p
Contract N123 (62861)50267A
NAVWEPS-17-20AG-98
Supersedes PB 168 030, NAVWEPS 17-20AG-98 dated 15 April 1965.

Descriptors: (*Test equipment (Electronics), Calibration), (*Pulse generators, Calibration), Test methods, Instruction manuals.

Identifiers: B7-B pulse generators.

The procedure describes the calibration of the Rutherford Electronics B7-B pulse generator. This instrument is a general-purpose pulse generator. It is capable of supplying a wide range of output levels, pulse width, and time delay at repetition rates of 20 Hz to 2 MHz. (Author)

PB-169 990 **Field 14B, 9C**
CFSTI Prices: HC$1.60 MF$0.50
Bureau of Naval Weapons, Washington, D. C.
DELAY GENERATOR MX-2962/U; 166D, H02-166D, H03-166D (HEWLETT-PACKARD), 1804-7 (HICKOK).
Technical manual instrument calibration procedure, AG-62.
1 Feb 66, 12p NAVWEPS 17-20AG-62

Descriptors: (*Test equipment (Electronics), Calibration), (*Sweep generators, Calibration), Delay circuits, Oscilloscopes, Test methods, Instruction manuals.

Identifiers: Delay generators, MX-2962/U delay generators.

The procedure describes the calibration of the Hewlett-Packard 166D, H02-166D, H03-166D, MX-2962/U, or Hickok 1804-7 delay generator, which is designed to provide delayed sweeps when used with a number of oscilloscopes.

PB-169 991 **Field 14B, 9C**
CFSTI Prices: HC$1.10 MF$0.50
Bureau of Naval Weapons, Washington, D. C.
DECADE RESISTORS; GENERAL RESISTANCE 105T AND 106T ANGSTROHM 106P AND 107P.
Technical manual instrument calibration procedure, AR-15.
15 Feb 66, 8p NAVWEPS 17-20AR-15

Descriptors: (*Test equipment (Electronics), Calibration), (*Resistors, Calibration), Resistance (Electrical), Measurement, Electric bridges, Test methods, Instruction manuals.

Identifiers: Decade boxes, 106P Decade resistors, 107P Decade resistors, 105T Decade resistors, 106T Decade resistors.

The procedure describes the calibration of the General Resistance 105T and 106T, and the Ang-

strohm 106P and 107P decade resistors. The instrument being calibrated will be referred to herein as the Test Instrument. The accuracy specifications given by the respective manufacturers are better than those presently needed to support the requirements of the instruments at the calibration laboratories. Therefore, the Test Instruments calibrated by this procedure have been degraded in accuracy to plus or minus 0.05%, and 'Limited Use' labels must be attached to the instruments. (Author)

PB-169 992 **Field 14B, 9C**
CFSTI Prices: HC$1.10 MF$0.50
Bureau of Naval Weapons, Washington, D. C.
INDICATING INSTRUMENTS; VOLTAGE/CURRENT-AC/DC.
Technical manual; instrument calibration procedure, AQ-24.
15 Jan 66, 9p NAVWEPS 17-20AQ-24

Descriptors: (*Test equipment (Electronics), Calibration), (*Voltmeters, Calibration), (*Ammeters, Calibration), Alternating current, Direct current, Test methods, Instruction manuals.

The procedure describes the calibration of direct and alternating (60 or 400 Hz) voltage and current meters. The measurement range and accuracy for the procedure is limited only by the range and accuracy of the equipment that is used. (Author)

PB-169 993 **Field 14B, 9C**
CFSTI Prices: HC$1.60 MF$0.50
Bureau of Naval Weapons, Washington, D. C.
PHASE METERS; PHAZOR MODELS 100A, 200A (INDUSTRIAL TEST EQUIPMENT CO.).
Technical manual; instrument calibration procedure, AZ-26.
1 Mar 66, 16p NAVWEPS 17-20AZ-26

Descriptors: (*Test equipment (Electronics), Calibration), (*Phase meters, Calibration), Test methods, Instruction manuals, Phase shift, Sensitivity.

Identifiers: 100A Phase meters, 200A Phase meters.

The procedure describes the calibration of the Industrial Test Equipment Co. model 100A and 200A Phazor phase meters. The test instrument indicates the phase sense and magnitude of null voltages over a wide range of input amplitudes and frequencies, and simplifies balancing these null voltages to zero when suitable bridge or nulling circuits are utilized. (Author)

PB-169 994 **Field 14B, 9C**
CFSTI Prices: HC$1.60 MF$0.50
Bureau of Naval Weapons, Washington, D. C.
VIBRATION METERS; MODELS M1, M3, M6 (MB MANUFACTURING CO., INC.).
Technical manual; instrument calibration procedure, SV-03.
1 Dec 65, 15p NAVWEPS 17-20SV-03

Descriptors: (*Test equipment (Electronics), Calibration), (*Meters, Calibration), (*Vibration, Meters), Transducers, Vibrators (Mechanical), Test methods, Instruction manuals.

Identifiers: M1 vibration meters, M3 vibration meters, M6 vibration meters, Vibration meters.

The MB Manufacturing Co. Model M1, M3, or M6 Vibration Meter is designed to indicate levels of displacement, velocity, and acceleration when excited by a vibration transducer having a sensitivity of 21.4 mv (rms) per 0.001 inch total displacement per 100 cps. The calibration of the test instrument is performed by applying signals of known amplitude and frequency which represent the output of a calibrated vibration transducer. (Author)

PB-169 995 **Field 14B, 9C, 17I**
CFSTI Prices: HC$4.60 MF$0.50
Bureau of Naval Weapons, Washington, D. C.
RADAR TEST SET; AN/UPM-70, AN/UPM-70A.
Technical manual; instrument calibration procedure, GQ-17.
1 Mar 66, 41p NAVWEPS 17-20GQ-17

Descriptors: (*Test equipment (Electronics), Calibration), (*Radar equipment, Calibration), Oscilloscopes, Signal generators, Test methods, Instruction manuals.

Identifiers: AN/UPM-70, Radar test sets.

The procedure describes the calibration of the AN/UPM-70 or AN/UPM-70A Radar Test Set, consisting of two basic units, the OS-56/UPM-70 or OS-56A/UPM-70 Oscilloscope and SM-85/UPM-70 or SM-Coder Simulator, each housed in an electrical equipment case. (Author)

PB-169 996 **Field 14B, 9C**
CFSTI Prices: HC$1.60 MF$0.50
Boeing Co., Seattle, Wash. Aero-Space Div.
AC-DC METER CALIBRATOR; MODEL 33 (RADIO FREQUENCY LABORATORIES, INC.).
Technical manual; instrument calibration procedure, AQ-40.
15 Dec 65, 15p
Contract N123 (62861) 35056A
NAVWEPS-17-20AQ-40

Descriptors: (*Test equipment (Electronics), Calibration), (*Meters, Calibration), (*Ammeters, Test equipment (Electronics)), Alternating current, Direct current, Test methods, Instruction manuals.

Identifiers: Ammeter calibrators, Model 30 AC-DC meter calibrators.

The procedure describes the calibration of the Radio Frequency Laboratories, Inc. Model 33 AC-DC- Meter Calibrator. The test instrument is a self contained unit providing accurate av, dv, ac, or dc outputs. (Author)

PB-169 997 **Field 14B, 9C**
CFSTI Prices: HC$1.60 MF$0.50
Bureau of Naval Weapons, Washington, D. C.
PUSH-BUTTON OSCILLATOR; 0.001 HZ TO 1.0 MHZ.
Technical manual; instrument calibration procedure, AG-18.
15 Nov 65, 19p NAVWEPS 17-20AG-18
Supersedes PB-181 047, NAVWEPS 17-20AG-18 dated 30 June 1959.

Descriptors: (*Test equipment (Electronics), Calibration), (*Oscillators, Calibration), Voltage, Frequency, Distortion, Noise, Electromagnetic pulses, Test methods, Instruction manuals.

The procedure describes the calibration of push-button oscillators with output frequencies of from 0.001 Hz to 1.0 MHz. Because of present technical limitations, the procedure provides distortion measurements of limited accuracy below 5Hz and above 40 kHz. After calibration, affix a Limited Use Label and tag to the Test Instrument stating the calibration limitation on the tag. (Author)

PB-169 998 **Field 14B, 9C**
CFSTI Prices: HC$1.60 MF$0.50
Bureau of Naval Weapons, Washington, D. C.
COAXIAL ISOLATORS WITH TYPE N CONNECTORS; FREQUENCY RANGE, 0.5 TO 10.0 GHZ.
Technical manual; instrument calibration procedure, GY-01.
15 Jan 66, 19p NAVWEPS 17-20GY-01

Descriptors: (*Test equipment (Electronics), Calibration), (*Coaxial cables, Calibration), Transmission lines, Standing wave ratios, Attenuation, Test methods, Instruction manuals.

Identifiers: Coaxial isolators.

The procedure describes the calibration of coaxial isolators having type N connectors.

PB-169 999 **Field 14B, 9C**
CFSTI Prices: HC$1.10 MF$0.50
Bureau of Naval Weapons, Washington, D. C.
TIME INTERVAL UNIT; 5262A (HEWLETT-PACKARD).
Technical manual; instrument calibration procedure, AF-32.
1 Feb 66, 10p NAVWEPS 17-20AF-32

Descriptors: (*Test equipment (Electronics), Calibration), (*Time-interval counter, Calibration), Oscillators, Voltage, Trigger circuits, Test methods, Instruction manuals.

Identifiers: 5262A time interval units.

The procedure describes the calibration of the Hewlett-Packard 5262A Time Interval Unit. The Test Instrument is a plug-in unit that is used to convert a Hewlett-Packard 5243L or 5245L electronic counter into an accurate time interval counter. (Author)

PB-170 202 **Field 14B, 9C**
CFSTI Prices: HC$1.60 MF$0.50
Boeing Co., Seattle, Wash. Aerospace Div.
PULSE GENERATOR; MODEL 570-A (KAY ELECTRIC RADA PULSE SR.).
Technical manual; instrument calibration procedure, AG-90.
1 Feb 66, 17p
Contract N123 (62861)35056A
NAVWEPS-17-20AG-90
Supersedes PB-168 460, NAVWEPS 17-20AG-90 dated 15 June 1965.

Descriptors: (*Test equipment (Electronics), calibration), (*Pulse generators, Calibration), Signal generators, Vidio signals, Test methods, Instruction manuals.

Identifiers: 570A pulse generators.

The procedure describes the calibration of the Kay Electric Rada Pulser Sr. Model 570-A signal generator. The Test instrument is a CW, pulsed carrier and video pulse generator, designed to be used in testing radar, TV, and other equipment. (Author)

PB-170 203 **Field 14B, 9C**
CFSTI Prices: HC$1.60 MF$0.50
Bureau of Naval Weapons, Washington, D. C.
PORTABLE MILLIVOLT POTENTIOMETER; MODEL 8686 (LEEDS AND NORTHRUP).
Technical manual; instrument calibration procedure, AE-35.
1 Mar 66, 11p NAVWEPS 17-20AE-35

Descriptors: (*Test equipment (Electronics), Calibration), (*Potentiometers, Calibration), Voltage, Galvanometers, Thermocouple pyrometers, Temperature sensitive elements, Test methods, Instruction manuals.

Identifiers: 8686 Potentiometers.

The procedure describes the calibration of the Leeds and Northrup 8686 millivolt potentiometer. The test instrument is used for precision testing of thermocouple pyrometers and for general temperature measurements. It also can be used as a calibrated direct voltage, zero current source. (Author)

PB-170 204 **Field 14B, 9C**
CFSTI Prices: HC$1.10 MF$0.50
SSCO Standards Lab., Inc., Southfield, Mich.
UHF OSCILLATOR; MODEL 1361-A (GENERAL RADIO).
Technical manual; instrument calibration procedure, AG-82.
1 Feb 66, 9p

Contract N123 (62861)35059A
NAVWEPS-17-20AG-82
Supersedes PB-168 334, NAVWEPS 17-20AG-82 dated 1 Jun 1965.

Descriptors: (*Test equipment (Electronics), Calibration), (*Oscillators, Calibration), Ultrahigh frequency, Power, Attenuators, Test methods, Instruction manuals.

Identifiers: 1361A oscillators.

The procedure describes the calibration of the General Radio Model 1361-A UHF Oscillator, which covers the range of 450 to 1050 Mc, having a power output of 20 mw to 125 mw depending upon the power supply used. (Author)

PB-170 205 **Field 14B, 9C**
CFSTI Prices: HC$2.60 MF$0.50
Bureau of Naval Weapons, Washington, D. C.
RF SIGNAL GENERATOR SET; AN/URM-26 (SG-45), AN/URM-26A (SG-45A), AN/URM-26B (SG-117).
Technical manual instrument calibration procedure, GG-06.
1 Dec 65, 29p NAVWEPS 17-20GG-06
Supersedes PB-181 390, NAVWEPS 17-20GG-05 dated 15 Jun 1962.

Descriptors: (*Test equipment (Electronics), Calibration), (*Signal generators, Calibration), Radiofrequency, Voltage, Attenuators, Pulse modulation, Test methods, Instruction manuals.

Identifiers: AN/URM-26.

The procedure describes the calibration of the AN/URM-26, AN/URM-26A, or AN/URM-26B RF signal generator set, which consists of the RF signal generator, transit case, attenuators, and accessory cables. The only item which normally requires calibration is the RF signal generator. (Author)

PB-170 206 **Field 14B, 9C**
CFSTI Prices: HC$1.60 MF$0.50
Boeing Co., Seattle, Wash. Aerospace Group.
TRANSISTOR TESTER KT-1 (BAIRD-ATOMIC).
Technical instrument calibration procedure, AY-17.
15 Jan 66, 16p
Contract N123 (62861)35056A
NAVWEPS-17-20AY-17

Descriptors: (*Test equipment (Electronics), Calibration), (*Transistors, Test equipment (Electronics)), Oscillators, Meters, Electric currents, Electrical impedance, Test methods, Instruction manuals.

Identifiers: KT-1 transistor testers, Transistor testers.

The procedure describes the calibration of the Baird-Atomic KT-1 transistor tester. The test instrument is a portable device for measuring transistor current amplification, input impedance, and dc reverse current. (Author)

PB-170 207 **Field 14B, 9C**
CFSTI Prices: HC$1.60 MF$0.50
Boeing Co., Seattle, Wash. Aero-Space Div.
FREQUENCY STANDARD; TS-65/FMQ-1, TS-65C/FMQ-1, TS-65D/FMQ-1. (AMERICAN TIME PRODUCTS 1296, COMMERCIAL EQUIVALENT OF TS-65/FMQ-1). (PRECISION ASSOCIATES C-0318, COMMERCIAL EQUIVALENT OF TS-65D/FMQ-1).
Technical manual; instrument calibration procedure, AF-30.
15 Dec 65, 11p
Contract N123 (62861)35056A
NAVWEPS-17-20AF-30

Descriptors: (*Test equipment (Electronics), Calibration), (*Pulse generators, Calibration), Frequency, Standards, Test methods, Instruction manuals.

Identifiers: TS-65/FQM-1, Frequency standards.

The procedure describes the calibration of the TS-65/FMQ-1, TS-65C/FMQ-1, and the TS-65D/FMQ-1 Frequency Standards. The test instrument is a portable multi-frequency generator designed to generate eleven frequencies between 10 and 190 cps. The test instrument generates negative going pulses at all eleven selected frequencies. (Author)

PB-170 208 **Field 14B, 9C**
CFSTI Prices: HC$1.60 MF$0.50
Bureau of Naval Weapons, Washington, D. C.
AUDIO OSCILLATOR; MODEL 1311-A (GENERAL RADIO CO.).
Technical manual; instrument calibration procedure, AG-93.
1 Jan 66, 12p NAVWEPS 17-20AG-93

Descriptors: (*Test equipment (Electronics), Calibration), (*Oscillators, Calibration), Audiofrequency, Test methods, Instruction manuals.

Identifiers: 1311-A audio oscillators, Audiofrequency oscillators.

The procedure describes the calibration of the General Radio 1311-A audio oscillator, a self-contained audio-frequency source that provides sinusoidal output at 11 fixed frequencies.

PB-170 209 **Field 14B, 9C**
CFSTI Prices: HC$1.10 MF$0.50
Bureau of Naval Weapons, Washington, D. C.
FREQUENCY CONVERTER; 5253A AND 5253B (HEWLETT-PACKARD).
Technical manual; instrument calibration procedure, AF-22.
15 Dec 65, 9p NAVWEPS 17-20AF-22

Descriptors: (*Test equipment (Electronics), Calibration), (*Frequency converters, Calibration), Frequency, Sensitivity, Test methods, Instruction manuals.

Identifiers: 5253 Frequency converters.

The procedure describes the calibration of the Hewlett-Packard 5253A and 5253B frequency converters. The test instrument is a plug-in unit which extends the range of a Hewlett-Packard model 5243L or 5245L electronic counter. (Author)

PB-170 210 **Field 14B, 9C**
CFSTI Prices: HC$3.60 MF$0.50
Bureau of Naval Weapons, Washington, D. C.
OSCILLOSCOPES; 535A, 545A, 545B, RM35A, RM45A, RM545B (TEKTRONIX).
Technical manual; instrument calibration procedure, AW-27.
15 Dec 65, 32p NAVWEPS 17-20AW-27

Descriptors: (*Test equipment (Electronics), Calibration), (*Oscilloscopes, Calibration), Sweep generators, Waveform generators, Trigger circuits, Test methods, Instruction manuals.

Identifiers: 535 Oscilloscopes, 545 Oscilloscopes, RM35 Oscilloscopes, RM45 Oscilloscopes, RM545 Oscilloscopes.

The procedure describes the calibration of the Tektronix 535A, 545A, 545B, RM35A, RM45A, and RM545B oscilloscopes, which are broadband laboratory oscilloscopes with calibrated main sweeps, calibrated delaying sweeps, sweep magnification, a square-wave calibrator, provisions for automatic or adjustable triggering from either internal or external sources, and the necessary power supplies. (Author)

UCRL-13160 **Field 14B, 9C**
CFSTI Prices: HC$3.00 MF$0.75
Lawrence Radiation Lab., Univ. of California, Berkeley.
TENSION WIRE SUPPORT STRUCTURES. A PARAMETRIC STUDY OF TENSION WIRE SUPPORT FOR INSTRUMENTATION.
Final rept. (Pt. 1),
by J. Frisch, and R. F. Steidel Jr. May 65, 72p
MD65-3-Pt-1
Contract W-7405-eng-48
Proj. UCX-2317

Descriptors: (*Electric wire, Supports), (*Suspension devices, Electric wire).

UCRL-13160 **Field 14B, 9C**
CFSTI Prices: HC$3.00
Lawrence Radiation Lab., Univ. of California, Berkeley.
TENSION WIRE SUPPORT STRUCTURES.
Final rept. pt. 2. Energy absorption in a cylindrical shell under tension wire loads,
by J. Frisch, and R. F. Steidel Jr. May 65, 69p
MD-65-3
Contract W-7405-ENG-48

Descriptors: (*Electric wire, Supports), (*Structural shells, Loading (Mechanics)).

AD-419 846 See Field 20C

AD-424 483 See Field 22C

AD-441 383 See Field 20B

AD-444 088 See Field 1A

AD-634 216 See Field 1C

AD-634 229 See Field 20I

AD-634 299 See Field 4A

AD-634 360 See Field 4B

AD-634 471 See Field 8L

AD-634 472 See Field 8L

AD-634 507 See Field 20E

AD-634 587 See Field 13A

AD-634 594 See Field 13K

AD-634 596 See Field 20I

AD-634 615 See Field 5A

AD-634 616 See Field 5A

AD-634 666 See Field 20K

AD-634 707 See Field 20A

AD-634 765 See Field 1C

ANL-6975 See Field 13H

LA-3454 See Field 13E

NAA-SR-11193 See Field 18I

NBS-TN-283 See Field 18H

PB-169 875 See Field 4B

PB-170 487 See Field 6L

SC-RR-65-491 See Field 6R

SC-RR-65-615 See Field 22C

UCRL-14359 See Field 7D

14C. RECORDING DEVICES

PB-169 410 **Field 14C, 5B**
CFSTI Prices: HC$1.60 MF$0.50
Potter Instrument Co., Inc., Plainview, N. Y.
PERFORMANCE CHARACTERISTICS OF HIGH DENSITY DIGITAL MAGNETIC TAPE RECORDING SYSTEMS,
by Andrew Gabor, and George E. Comstock.
1960, 14p
NSF Scientific Documentation Project.

Descriptors: (*Digital recording systems, Magnetic type), (*Documentation, Digital recording systems), Digital computers, Performance (Engineering), State-of-the-art reviews, Data storage systems, Information retrieval.

A description is given of the performance characteristics which have been obtained with a high density digital magnetic tape recording system designed for use at high data transfer rates in digital computers. It includes a discussion of the current 'state of the art' capabilities of this type of recording with consideration of its use in Pulse Code Modulation (PCM) recording for instrumentation and telemetry applications. Data on recovery reliability are presented.

AD-634 742 **See Field 17I**

14D. RELIABILITY

AD-634 385 **Field 14D, 17B**
CFSTI Prices: HC$1.00 MF$0.50
Army Electronics Command, Fort Monmouth, N. J.
TECHNIQUE USED IN DETERMINING FIELD OPERATIONAL RELIABILITY.
Technical rept.,
by Joseph W. D'Oria. May 66, 18p ECOM-2709
Task 1E6-20501-A173-02-05

Descriptors: (*Radio equipment, 8reliability (Electronics)), Army equipment, Failure (Electronics), Operation, Maintenance, Data.

Identifiers: MTBF.

The report depicts several of the problems involved in conducting an investigation to determine the operational reliability of an Army radio set utilized under actual field conditions. A reporting form was distributed to the troops prior to the exercise commencement. The form was designed to require little time for its completion and yet yield sufficient information for a meaningful analysis. Three different monitoring techniques were studies to determine which would provide the most accurate and informative data with the manpower and facilities available. The technique employed was to visit each operating site twice daily, checking the reporting form against the operator's daily log; in the event of a system failure occurrence, interview both the operator and maintenance man, recording all data pertinent to the failure. Due to the lack of manpower, accurate maintenance information could not be obtained after failed equipment was sent from the operating site. Analysis of the data revealed the presence of a bias. The equipment had been used regularly at least several months prior to the exercise commencement, however, approximately thirty percent of the failures occurred in the first 420 hours. Potential causes of this bias are discussed in the body of the report. (Author)

AD-634 739 **Field 14D, 14A**
CFSTI Prices: HC$1.10 MF$0.50
Naval Air Development Center, Johnsville, Pa. Air Warfare Research Dept.
DEVELOPMENT OF WEAPON SYSTEM RELIABILITY GOALS FROM OPERATIONS ANALYSIS,
by L. Rogin, and J. Brown. Nov 60, 13p NADC-WR-6030
Task R520-OD-005/202-4/F018-02-003
Prepared for presentation at the Navy-Industry Conference on Aeronautical Material Reliability (4th), 1-2 Nov 60.

Descriptors: (*Weapon systems, *Reliability), Effectiveness, Cost effectiveness, Analysis, Performance (Engineering), Operations research.

The manner in which operations analysis is employed to evaluate the performance of a proposed naval weapon system is discussed. The importance of such studies in the early development stage of a system is emphasized as a means of establishing optimum values of system performance factors. An example is given which illustrates the fact that reliability can be an extremely critical performance factor. The role of operations analysis in developing reliability goals is shown to be the determination of that reliability which corresponds to the maximum military effectiveness for the resources expended. (Author)

AD-634 335 **See Field 12A**

AD-634 352 **See Field 12A**

14E. REPROGRAPHY

AD-634 184 **Field 14E, 15E**
CFSTI Prices: HC$2.00 MF$0.50
Marine Corps Landing Force Development Center, Quantico, Va.
MODERNIZATION OF REPRODUCTION TRAINS.
Interim rept. no. 1.
14 Jun 66, 28p
Proj. 45-64-05

Descriptors: (*Reproduction, *Logistics), (*Photographic equipment, Logistics), Systems engineering, Marine Corps, Mobile, Terrain, Inventory, Mapping, Standardization, Military requirements.

Identifiers: Reprography.

The project was established to: (1) Modernize reproduction trains by the addition of required small duplicating machines and related equipment, and by modification or relocation of equipment currently installed. (2) Provide drawings and specifications to enable standardization of all components in the reproduction trains throughout the Marine Corps. (3) Reduce the logistic requirement of Force and Division reproduction trains.

AD-634 748 **Field 14E, 8J**
CFSTI Prices: HC$4.00 MF$0.75
Vidya Div., Itek Corp., Palo Alto, Calif.
OCEANOGRAPHIC SPECTRAL PHOTOGRAPHY. PART I. BASIC INVESTIGATIONS.
Final rept.,
by E. A. Bailey. 29 Apr 66, 18p Vidya-219-Pt-1
Contract Nonr-4786 (00)
Projs. NR-215-014, Vidya-9268
Document contains color; but will be reproduced in black and white only after original stock is exhausted.

Descriptors: (*Multiband spectral reconnaissance, *Aerial photography), (*Oceanology, Multiband spectral reconnaissance), Underwater objects, Ocean bottom topography, Photogeology, Photographic techniques.

This report presents the results of an investigation of the potential value of spectral multiband photography, and multiband imagery in general, for increasing the depth at which underwater objects and/or disturbances can be observed by aerial photography. The program included the collection of multiband photography over a series of selected targets, the special processing of this photography, and the analysis of the resulting displays. Special techniques developed by Itek Corporation for extracting spectral information from multiband photography are described and the results obtained with various techniques are illustrated. The special techniques suppress surface reflections while enhancing spectral differences among submerged objects, resulting in increased depths at which objects of bottom features can be differentiated. The most successful procedure tested made use of four spectral band and comparatively simple masking procedures to suppress surface reflections. The problem of observing subsurface disturbances such as produced by underwater explosions was considered, and theoretical calculations were carried out which indicate a limiting depth of approximately 30 feet for observing such a disturbance under optimum conditions in typical ocean waters. (Author)

N66-16076 **Field 14E**
CFSTI Prices: HC$5.00 MF$1.00
Franklin Systems, Inc., West Palm Beach, Fla.
SCINTILLATION TYPE NUCLEAR DENSITOMETER, MODEL 143 A. HIGH COUNTING RATE, SCINTILLATION TYPE NUCLEAR DENSITOMETER, MODEL 143 B. EVALUATION OF PRECISION GAMMA RADIATION DENSITOMETER TECHNIQUES FOR CRYOGENIC LIQUIDS.
Final rept.
31 Dec 63, 179p
Contract NAS8-13
NASA-CR-69709

Descriptors: *Densitometer, *Gamma ray beam, *Liquid oxygen (Lox), *Liquid hydrogen.

For abstract, see T 66 15.

AD-294 869 **See Field 14B**

AD-634 149 **See Field 13B**

AD-634 285 **See Field 8B**

AD-634 676 **See Field 15D**

PB-169 495 **See Field 13B**

15A. ANTISUBMARINE WARFARE

AD-634 255 **See Field 8J**

15B. CHEMICAL, BIOLOGICAL, AND RADIOLOGICAL WARFARE

AD-273 112 **Field 15B, 12A**
CFSTI Price: HC$6.60
New York Univ., N. Y. Research Div.
CW MATHEMATICAL RESEARCH.
Quarterly progress rept. no. 7, 1 Nov 61-31 Jan 62.
by M. L. Norden, and L. H. Herbach. 13 Feb 62, 61p
Contracts DA-18-108-405-CML-788, DA-18-108-405-CML-6617
Proj. 772

Descriptors: (*Chemical warfare casualties, Lethal dosage), (*Mathematical prediction, Chemical warfare casualties), Monte Carlo method.

A method is given for improving the mathematical analysis of the effect of the lethality vs. dose function on the expected number of casualties, and a better understanding obtained of when certain approximations apply. It depends on the introduction of a random variable for lethality. The effect of the lethality vs. dose function on the variance of casualties is obtained. This variance is now expressed in terms of the joint distribution of men, the lethality distribution, and joint distributions of the total dosages ingested. The possibility is considered of using a second Monte Carlo procedure to compute the A (D) curve from each sample

or trial obtained by the first or basic Monte Carlo procedure. A series of test calculations to be computed is given. (Author)

AD-467 436 Field 15B, 7D, 6A
CFSTI Prices: HC$3.60 MF$0.50
Southern Research Inst., Birmingham, Ala.
THE USE OF POLYMER UNZIPPING FOR THE DETECTION OF BIOLOGICALLY ACTIVE AGENTS.
Quarterly rept. no. 4, Mar-Jun 65,
by Edward B. Dismukes, and Edward R. Covington. 30 Jun 65, 36p Rept. no. 7352-1623-Pt-4
Contract DA-18-035-AMC-265 (A)
Task 1A012501B02802

Descriptors: (*Chemical warfare agents, Detection), (*Aldehydes, Polymers), (*Acetal plastics, Decomposition), Physical properties, Polymerization, Reaction kinetics, Spectra (Infrared), X-ray diffraction analysis, Differential thermal analysis, Molecular weight, Solubility.

Identifiers: Heptyl aldehydes.

The over-all purpose of the research was to determine the feasibility of detecting biologically active agents by their initiation of the depolymerization of certain polymers in a rapid unzipping chain mechanism. The report discusses work on polymers of n-heptaldehyde. Two types of these polymers were prepared, the uncapped type with hydroxyl end groups and the capped type with acetate end groups. Their physical properties were characterized and found consistent with the expected properties of linear polyacetals. Rates of depolymerization at room temperature were studied and found to be relatively rapid for uncapped polymers in CC l4 solution. The principal conclusions drawn from the results are that the kinetics of depolymerization of n-heptaldehyde polymers may be favorable for the proposed application in detection but that further research is necessary to evaluate these polymers more fully. (Author)

AD-634 628 Field 15B
CFSTI Prices: HC$1.00 MF$0.50
Army Biological Center, Frederick, Md.
CHEMILUMINESCENCE AS A TOOL FOR BIODETECTION,
by Harold A. Neufeld, Lee T. Carleton, and Samuel Witz. Jun 66, 12p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Biological warfare agents, Detection), (*Chemiluminescence, Biological warfare agents), Bacteria, Catalysts, Proteins, Hemoglobin, Hydrogen peroxide, Ketones, Catalase, Instrumentation.

Identifiers: Luminol, Biological agent indicators.

A description is given of the development of a system capable of detecting bacteria in the range of 10,000 organisms per ml (i.e., 0.00000001 gram). The system is based on the hematin-catalyzed chemiluminescence of luminol.

AD-634 534 See Field 18H

AD-634 653 See Field 6A

15C. DEFENSE

AD-634 313 Field 15C, 17B, 5E
CFSTI Prices: HC$2.00 MF$0.50
Army Personnel Research Office, Washington, D. C.
HUMAN FACTORS RESEARCH IN COMMAND INFORMATION PROCESSING SYSTEMS,
by S. Ringel, F. L. Vicino, and R. S. Andrews. Mar 66, 27p Technical research rept. 1145
Proj. DA-2J024701A723

Descriptors: (*Command + control systems, Decision making), (*Combat information centers, *Human engineering), Data processing systems, Display systems, Military requirements, Military tactics, Computers, Information retrieval.

The report describes the scope, rationale, organization, and progress of a command systems research program to provide human factors information needed for performance within complex automated information processing systems. Following a survey of military information processing equipment and operations and future plans for command information processing systems, basic human factors problems were identified and organized around five critical operations--screening incoming data, transforming raw data for input into storage devices, input, assimilation of displayed information, and decision making. A research program was formulated and studies undertaken to yield empirical information about the effects on human performance of (1) characteristics of the information presented (density, amount, etc.); (2) dynamic aspects of information (type, extent, coding of updates); (3) display modes and sensory modalities (group vs individual displays, multisensory displays); and (4) computer aids to the decision process. A Command Systems Laboratory was developed to permit simulation of various TOS functions. Findings have suggested the possibility of reduction in storage capacity requirements, number of displays called from storage during a given operational time period, and time required for the total information assimilation-decision process and supported the incorporation and use of information conspicuity coding capabilities in command systems. (Author)

AD-634 377 Field 15C, 16D, 22B
CFSTI Prices: HC$3.00 MF$0.75
Aerospace Technology Div., Library of Congress, Washington, D. C.
ANTIMISSILE WARFARE.
ATD work assignment no. 79, task 46,
by Daniel Wolkonsky. 18 Apr 66, 100p ATD-66-41
TT-66-61509
Trans. of mono. Voennoe Izdatelstvo Ministerstva Oboroni, Moscow, 1965 128p. Rept. on Surveys of Soviet Scientific Technical Literature.

Descriptors: (*Antimissile defense systems, State-of-the-art reviews), USSR, Guided missiles, Military satellites, Reviews, Guided missile detection, Guided missile defense systems, Target acquisition, Target recognition, Tracking, Early warning systems, Search radar, Radar stations, Military satellites, Guided missiles (Surface-to-surface), Guided missiles (Surface-to-air), Guided missiles (Air-to-surface), Guided missile (Air-to-air), Guided missile warheads.

The booklet presents a brief and systematic discussion of the basic information available on the missile weapons of the main capitalistic countries, the technical possibilities of intercepting missiles in flight, and also on the means and methods of antimissile operations. In simple and popular form the author acquaints the reader with the state of military missiles in foreign lands and the prospects of their development. He defines the aims and tasks of antimissile operations, gives information on the scientific and technological solution of the problem of missile interception, and explains the role played in this connection by radioelectronics and complex automated control systems. The booklet discusses methods based on recent scientific and technical achievements which are now applied in solving the problem of missile destruction. It contains a brief analysis of these methods and examines some basic trends directed toward improving them. All the factual material in this booklet is derived from unclassified foreign publications. The booklet is intended for a large circle of military readers and for those who have not had special training in the field of missile armament. (Author)

15D. INTELLIGENCE

AD-634 676 Field 15D, 14E
CFSTI Prices: HC$1.00 MF$0.50
Army Natick Labs., Mass.
MILITARY IMPLICATIONS OF SEASONAL ENVIRONMENTAL CHANGE AS REVEALED THROUGH TIME-LAPSE PHOTOGRAPHY,
by Roland J. Frodigh. Jun 66, 15p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Climatology, Photographic recording systems), (*Geography, *Photographic recording systems), Ecology, Terrain, Plants (Botany), Colors, Photographic techniques, Photographic equipment, Military intelligence.

Information on seasonal environmental change is of substantial military importance since equipment design criteria, logistics, and basic survival requirements are all affected by the variables of seasonality. This paper describes a program in which photographic time-lapse techniques were used to portray landscapes in a typical midlatitude region, New England, from the same site at different seasons. To show the full impact of seasonal variation the identical field-of-view was repeated. All landscapes were recorded in color.

15E. LOGISTICS

AD-634 198 Field 15E
CFSTI Prices: HC$4.60 MF$0.50
RAND Corp., Santa Monica, Calif.
OPTIMAL REPLACEMENT AND INSPECTION OF STOCHASTICALLY FAILING EQUIPMENT,
by D. W. Jorgenson, and R. Radner. 16 Aug 60, 41p P-2074

Descriptors: (*Optimization, *Inventory control), (*Replacement theory, Inventory control), Maintenance, Uncertainty.

In preparedness-type models of single-part equipment, with an objective of maximizing the proportion of the time that the system is in a good, ready state, optimal replacement policies are periodic, and the optimal period is easily computed. The same is true of inspection, if the part has an exponential distribution of time to failure. In the case of equipment with several parts, the possibility of opportunistic maintenance arises, to take advantage of 'economies of scale' in maintenance actions. In the simple cases we have discussed, concerning equipment with two parts, one of which is monitored, the optimal policies are of the (n, N) type, which includes the periodic type as a special case. Models with more than two parts appear to present serious analytical difficulties, if one wishes to take account of economies of scale. It is likely, furthermore, that optimal policies in such cases would typically be too complicated for practical use. It may turn out, therefore, that policies of the (n, N) type will provide good practical solutions to problems involving many-part systems. Much work remains, of course, in developing techniques for optimizing even within this simple class. (Author)

AD-634 720 Field 15E, 6Q, 6H, 5E K
CFSTI Prices: HC$3.00 MF$0.75
Army Natick Labs., Mass. Pioneering Research Div.
HUMAN FACTORS ASPECTS OF THE QM-EQUIPPED SOLDIER IN JUNGLE OPERATIONS: AN OPERATIONAL APPROACH.

Technical rept.,
by Joseph T. Tambe, and George E. Stembridge.-
May 66, 70p EPT-3
Proj. DA-1K0-24701-A122
USA-NLABS-TR-66-48-PR

Descriptors: (*Human engineering, Logistics), (*Army personnel, *Jungles), (*Clothing, Human engineering), (*Military rations, Human engineering), Armed forces supplies, Armed forces operations, Tropical tests, Mobility, Loading (Mechanics).

The study explores human factors problems associated with jungle operations by means of field observations made during tactical exercises conducted at the Jungle Warfare Training Center. The operational and physical environments, required soldier tasks and activities, and the equipment used are described. The major problems discussed concern combat load, heat, mobility, and certain features of rations. (Author)

AD-457 925 See Field 5A

AD-634 184 See Field 14E

AD-634 196 See Field 5A

AD-634 271 See Field 6P

AD-634 737 See Field 5C

AD-634 753 See Field 1C

AD-634 754 See Field 1C

AD-634 776 See Field 11K

15F. NUCLEAR WARFARE

AD-634 204 Field 15F
CFSTI Prices: HC$7.00 MF$1.50
Institute for Defense Analyses, Arlington, Va. Economic and Political Studies Div.
THERMAL EFFECTS OF NUCLEAR WEAPONS. LITERATURE SUMMARIES.
Research paper,
by Abner Sachs, and Dorothy Harris. Jan 66, 328p RP-P-221, IDA-HQ-66/4480
Contract OCD-OS-63-134
Task 4113-C

Descriptors: (*Nuclear explosion damage, *Fires), Abstracts, Ignition, Materials, Flammability, Combustion, Fire safety, Countermeasures, Indexes.

Contents: Ignition of materials, ignition points, atmospheric effects, thermal effects of nuclear detonation, fire susceptibility factors, thermal damage assessment models, fire development, mass fires, fire spread models, countermeasures, fire protection.

AD-634 723 Field 15F
CFSTI Prices: HC$2.00 MF$0.50
School of Aerospace Medicine, Brooks AFB, Tex.
PREDICTION OF EYE SAFE SEPARATION DISTANCES.
Rept. for Jan-Feb 66,
by Everett O. Richey. Jun 66, 28p
Projs. AF-6301, AF-5710
Tasks 630103, 03.003

Descriptors: (*Nuclear explosions, Safety), (*Retina, Explosion effects), Eye, Hazards, Airburst, Flashblindness, Light, Optical filters, Afterimages, Burns.

A method is given for predicting the distances at which the thermal radiation from nuclear detonations will be hazardous to the unprotected human eye. This method relates calculated retinal exposure to experimentally determined eye effects data. Eye hazards as a function of distance are determined for the unprotected human eye exposed to sea-level, air-burst detonations from 0.01 to 10 kt yield. The pupil diameter of the human eye is taken to be 2.5 mm. and 6.0 mm. respectively, for day and night conditions and the effective focal length of the eye is taken to be 17 mm. Nuclear detonation characteristics and scaling factors are taken from Glasstone's 'The Effects of Nuclear Weapons'. The results indicate that the eye hazard is the limiting factor in determining the distance of nearest approach to a nuclear detonation unless eye protection is provided. Eye hazards as a function of distance are also determined for the human eye protected from daytime detonations by a 2% transmission fixed filter. The results indicate that use of such a filter will provide eye protection at distances where other hazards become limiting factors. (Author)

AD-634 741 Field 15F, 15G, 5D
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
THE STRATEGIC CONSEQUENCES OF NUCLEAR PROLIFERATION,
by James R. Schlesinger. Jun 66, 21p P-3393

Descriptors: (*Nuclear warfare, *Military strategy), USSR, United States, Political science, Public opinion, Countermeasures.

The strategic position that the United States and the Soviet Union currently enjoy is so unassailable that even continuing action by third parties is unlikely to upset the central strategic balance for the next twenty years. Properly exploited, this central strategic balance could continue to provide some stability in regional conflicts--even in the face of nuclear spread.

15G. OPERATIONS, STRATEGY, AND TACTICS

AD-634 401 Field 15G
CFSTI Prices: HC$3.00 MF$0.75
Analytic Services, Inc., Falls Church, Va.
PRESENT AND ANTICIPATED ALTERNATIVE UNITED STATES MILITARY STRATEGIES.
ANSER summary rept.,
by Frederick S. Pishky. Nov 65, 64p AR-65-10
Contract AF 49 (638)-1259

Descriptors: (*Military strategy, United States), Management planning, Arms control, Political science, Nuclear warfare, Counterinsurgency, Limited war.

Five competing military strategies are presented which can be used in planning for the future needs of the United States. These strategies are considered plausible within the framework of today's international political realities. A survey of the military environment from the end of World War II until the present identified two constant elements in military strategic thinking--forward deployment and controlled response. These elements were used as criteria to eliminate less plausible strategies. The strategies finally chosen are described in terms of four categories of conflict (general nuclear war, controlled strategic-nuclear war, limited war, and counterinsurgency) and in terms of force capabilities associated with the kinds of conflict (assured destruction, damage limitation, limited conflict, and counterinsurgency operations). (Author)

AD-634 599 Field 15G, 12A
CFSTI Prices: HC$1.00 MF$0.50
Ballistic Research Labs., Aberdeen Proving Ground, Md.
A NON-LINEAR PROGRAMMING PROBLEM INVOLVING WEAPON ALLOCATIONS.
Memo rept.,
by W. Sacco, and P. Schlegel. Mar 66, 15p BRL-MR-1734
Proj. 1P014501A14B

Descriptors: (*Nonlinear programming, *War games), Weapons, Targets, Scheduling, Kill probabilities, Dynamic programming.

A weapon allocation problem of current interest in weapons evaluation studies in the Ballistic Research Laboratories is formulated as a nonlinear, integer programming problem. A method for finding solutions to the problem is proposed. (Author)

AD-634 259 See Field 5I

AD-634 471 See Field 8L

AD-634 512 See Field 14A

AD-634 513 See Field 5I

AD-634 741 See Field 15F

16A. MISSILE LAUNCHING AND GROUND SUPPORT

AD-634 694 Field 16A, 13I
CFSTI Prices: HC$2.60 MF$0.50
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
FINAL STATIC AND DYNAMIC TESTS OF THE FLUID MAGNETIC SPRING AND LOCKOUT DEVICE FOR POLARIS LAUNCH TUBES,
by R. E. Kemelhor, and D. R. Conrad. 1966, 27p TG-471
Contract NOrd-7386
See also AD-631 646.

Descriptors: (*Guided missiles (Underwater-to-surface), Guided missile launchers), (*Guided missile launchers, Springs), Damping, Fluids, Magnetic materials, Vibration isolators, Tests, Shipborne, Viscosity, Drop testing, Orifices.

The object of the development and the final series of tests was to demonstrate that the prototype would provide a linear spring when nonmagnetized and essentially a hardened lockout device when magnetized. The results of the tests indicate that the Magnetic Spring is essentially a linear liquid spring when nonmagnetized and provides definite evidence of viscosity control of the working fluid when magnetized. Complete lockout characteristics were not fully demonstrated. However, the data indicate that under both static and dynamic conditions there is a definite change in the slope of the force deflection curve, which can be converted to complete lockout by redesigning the basic mechanical mechanism and orifice configuration. The redesign features made evident during these tests indicate that the amount of compressible fluid ahead of the magnetic orifice should be decreased appreciably, the slurry should be the only fluid used in the device, and the coil size and length of magnetic orifice should be increased to obtain the desired lockout effect. (Author)

AD-473 571 See Field 11C

AD-634 301 See Field 5I

16B. MISSILE TRAJECTORIES

AD-634 267 Field 16B
CFSTI Prices: HC$3.00 MF$0.75
Picatinny Arsenal, Dover, N. J. Mathematical Analysis Div.
TRAJECTORY EQUATIONS FOR A SIX-DEGREE-OF-FREEDOM MISSILE USING A FIXED-PLANE COORDINATE SYSTEM.
Technical rept.,
by B. Barnett. Jun 66, 80p
PA-TR-3391
See also AD-615 569.

Descriptors: (*Guided missile trajectories, *Equations of motion), Moments, Force (Mechanics), Matrix algebra, Rotation.

This report derives from elementary principles the general equations of motion for a missile utilizing a fixed-plane coordinate system, i.e., a coordinate system with one axis constrained to lie in a

given plane. Included in the derivation are explicit expressions for introducing wind and an alternate set of equations to be used when singularity conditions are approached. Means are provided for automatically converting to the alternate set of equations so that uninterrupted trajectory simulation can proceed under all conditions. A complete discussion of initial conditions is included. The general equations can be used for flat or spherical, rotating, or nonrotating earth cases. (Author)

AD-634 638 **Field 16B**
CFSTI Prices: HC$1.00 MF$0.50
Army Research Office, Durham, N. C.
ON A RELATIONSHIP BETWEEN THE ERRORS OF POSITION, VELOCITY AND ACCELERATION,
by Theodor W. S. Schmidt. Jun 66, 7p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Guided missile tracking systems, *Position finding), Flight testing, Guided missile trajectories, Velocity, Acceleration, Errors, Correlation techniques, Numerical analysis.

For abstract, see T 66 15.

AD-634 672 **See Field 4B**

AD-634 695 **See Field 4B**

AD-634 696 **See Field 4B**

AD-634 726 **See Field 4B**

AD-634 727 **See Field 4B**

AD-634 752 **See Field 4B**

AD-634 757 **See Field 4B**

AD-634 760 **See Field 4B**

16C. MISSILE WARHEADS AND FUSES

N66-14526 **Field 16C**
CFSTI Prices: HC$4.00 MF$1.00
Space and Information Systems Div., North American Aviation, Inc., Downey, Calif.
A STUDY TO DEFINE A STATE-OF-THE-ART ROCKET VEHICLE SUITABLE FOR SYNOPTIC METEOROLOGICAL SOUNDINGS, VOLUME I.
Final rept.
16 Jun 65, 136p SID-65-411-1A
Contract NAS1-4427
NASA-CR-66002 Vol. I

Descriptors: *Sounding rocket, *Synoptical measurement, *Systems design, *Meteorological flight.

AD-634 446 **See Field 19A**

16D. MISSILES

AD-634 662 **Field 16D, 20D**
CFSTI Prices: HC$1.00 MF$0.50
Army Missile Command, Redstone Arsenal, Ala.
A CORRELATION OF THE BASE DRAG OF BODIES-OF-REVOLUTION WITH A JET EXHAUSTING THROUGH THE BASE,
by Charles E. Brazzel, and James H. Henderson. Jun 66, 15p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Guided missiles, *Drag), (*Exhaust gases, Base flow), Bodies of revolution, Correlation techniques, Jets, Guided missile trajectories, Thrust, Afterbodies.

In spite of the many parameters involved in the complex fluid mechanics phenomenon associated with power-on base drag, a small number of expressions can be formulated through systematic correlation of experimental results to accurately describe the combined effects of all parameters. The expressions formulated lead to a better understanding of parameters which must be considered for selection of optimum missile configuration. Combining the expressions yields an empirical equation for estimating base drag which requires only a slide-rule or a desk calculator for solutions, and which is amenable to direct inclusion in computerized missile trajectory analysis. It is felt that this technique will lead to better analytical definition of missile afterbody-propulsion configuration, thus limiting experimental investigations to verification rather than developmental studies. (Author)

AD-473 571 **See Field 11C**

AD-634 368 **See Field 9F**

AD-634 377 **See Field 15C**

AD-634 570 **See Field 22D**

17A. ACOUSTIC DETECTION

AD-455 919 **Field 17A**
CFSTI Price: HC$3.60
Electro-Voice, Inc., Buchanan, Mich.
ACOUSTIC TELESCOPE.
Final rept.,
by Tom Lininger, and Carl Goy. Nov 64, 33p
Contract DA-18-001-AMC-312 (X)

Descriptors: (*Acoustic detectors, Telescopes), Design, Microphones, Amplifiers, Tests, Band-pass filters, Detection, Auditory signals.

The purpose of the contract was the development of a system which would improve upon the capabilities of the unaided ear to detect and recognize audio signals. A microphone and amplifier combination was chosen to provide the greatest hearing enhancement and the system was then tested under various operating conditions. The results of the testing were compiled in a separate field test report and were used as a basis for recommending changes in and further study of the device. (Author)

AD-634 249 **Field 17A, 9A, 20A**
CFSTI Prices: HC$1.00 MF$0.50
Navy Underwater Sound Lab., New London, Conn.
EVALUATION OF LOW-FREQUENCY, BROADBAND, FREE-FLOODING MAGNETOSTRICTIVE SCROLL TRANSDUCERS.
Research rept.,
by Theodore J. Meyers. 14 Jun 66, 16p USL-154
Proj. SF-101-03-18
Task 8044
See also AD-630 770.

Descriptors: (*Magnetostrictive elements, *Transducers), Underwater sound equipment, Extremely low frequency, Broadband, Cavity resonators, Rings, Magnetostriction, Sound transmission.

Identifiers: Scroll transducers.

The report presents the experimental results of the evaluation of low-frequency, broad-band, free-flooding magnetostrictive scroll transducers, the design of which is based upon previous work done with high-frequency models. The bandwidth of free-flooding magnetostrictive scroll transducers may be increaded by properly coupling (or staggering) the cavity and mechanical ring resonant frequencies of the transducer. It is possible to achieve a usable bandwidth of about one octave; however, the broad-band scrolls have greater weight and lower peak efficiency than do the narrow-band scrools. In spite of their greater weight, free-flooding magnetostrictive scroll transducers have advantages over other types of transducers in that they are rugged, reliable, and easily constructed; they should be highly resistant to damage from explosive shock; and they are insensitive to hydrostatic pressure. In some applications, the advantages of free-flooding magnetostrictive scroll transducers may far outweigh their disadvantages. (Author)

AD-634 546 **Field 17A, 20A**
CFSTI Prices: HC$2.00 MF$0.50
California Inst. of Tech., Pasadena. Div. of Engineering and Applied Science.
ECHOES FROM HOLLOW ALUMINUM SPHERES IN WATER,
by K. Jerome Diercks, and Robert Hickling. Mar 66, 42p Rept. no. 122.2
Contract N60530-12065

Descriptors: (*Echo ranging, Sonar targets), (*Sonar targets, *Spheres), (*Aluminum, Sonar targets), Sonar, Sound transmission, Underwater sound, Acoustics.

Recorded far-field echoes from precision hollow aluminum spheres in water, with different shell thicknesses and with either water or air in the hollow interior, are compared with calculated echoes. Steady state echoes are investigated over a range of ka from 6 to 27, and individual pulsed echoes at ka = 20. Excellent verification is obtained for the features predicted by the theory. It is shown that the echoes are sensitive to changes in the elastic properties of the shell, particularly when the shell is thin. The experiments showed moreover that the echoes are dependent on the orientation of the sphere. This is due presumably to asymmetries in the structure and properties of the shell and emphasizes again the strong interrelation between sonar echoes and the nature of the material in the target. (Author)

AD-634 202 **See Field 20A**

AD-634 203 **See Field 20A**

RFP-598 **See Field 18G**

17B. COMMUNICATIONS

AD-294 781 **Field 17B**
CFSTI Price: HC$2.60
Bell Helicopter Co., Fort Worth, Tex.
EXPERIMENTAL EVALUATION OF AN EIGHT-INCH CRT CONTACT ANALOG PRESENTATION.
May 62, 28p D2280421-011
Army-Navy Instrumentation Program.

Descriptors: (*Television display systems, Analog systems), Analog computer, Electronic circuits, Cathode ray tubes, Helicopters, Horizontal indicators, Simulation.

A summary is presented of the work undertaken to determine the effect upon performance of a change in geometric perspective of ground plane information as introduced by a reduction in the physical size of a contact analog display. This study was necessitated by the introduction of a 'compression' factor which is associated with a reduction in display size when achieved with projection or closed circuit TV systems. Since this compression factor represents a departure from real-world coincidence, it was necessary to determine its effect upon hovering performance when compared with the Autonetics display in which the compression factor was not present. The results indicate that the differences in performance on the two displays were not significant and that

rather gross changes could be made in ground plane perspective without affecting performance. Although the limits of such allowable changes have not been established, it would appear that as long as the perceptual relationship between the generated ground plane and the earth's surface is analogous, then the limits of such changes might be quite broad. (Author)

AD-401 457 **Field 17B**
CFSTI Price: HC$15.60
Marquardt Corp., Van Nuys, Calif.
RESEARCH INVESTIGATIONS ON PHOTO FACSIMILE TRANSMISSION TECHNIQUES.
Quarterly progress rept. no. 2, 1 Oct-31 Dec 62, by W. H. Hell, B. Case, J. A. Howard, R. M. Ransier, and C. Schuppe. Jan 63, 170p Rept. no. 25069
Contract DA-36-039-sc-90862
Proj. DA-3A99-12-001

Descriptors: (*Facsimile transmission, Optical images), Facsimile equipment, Scanners, Facsimile recording systems.

Representative data for describing scenes was acquired. While no attempt was made to classify all possible scenes, sufficient examples are presented to establish guide-lines for transducer requirements as functions of active scene irradiance and of geometry and spectral properties of scene elements. Data on performance characteristics and practical parametric interrelationships of most types of image transducing techniques is presented. Several line scanning techniques for the optical readout of a stored image were investigated. These techniques include a programmed matrix light source with a fiber optic converter to provide a line scan, a flying spot scanner employing a fiber optic line converter, and the Kaiser Electronic special line scan facsimile tube. Furthermore, a number of novel mechanical scanner configurations were conceived. Two image storage techniques were studied: (1) The optron (a photoconductor-electroluminophor combination); (2) the ferrotron (a photoconductor-ferroelectric combination). The former has achieved 80 lines per inch resolution and 0.1 foot candle sec. sensitivity, while the latter has achieved 250 lines per inch under an illumination of 0.001 foot candles, and appears more promising as a component for an advanced photo facsimile transmission system.

AD-447 114 **Field 17B**
CFSTI Price: HC$14.60
Radio Corp. of America, New York. Defense Electronic Products.
STUDY AND APPLICATION OF ADAPTIVE COMMUNICATION TECHNIQUES IN THE DEFENSE COMMUNICATION SYSTEM.
Final rept. no. 3,
by M. Masonson. 5 Sep 64, 151p CR-64-419-12
Contract DCA-6
Proj. 40500AR
Task 40502AR
Report on System Adaptive Techniques.

Descriptors: (*Adaptive communication systems, Data transmission systems), Digital systems, Transmission lines, Telephone communication systems, Errors, Bandwidths, Background, High frequency, Data storage systems, Noise (Radio), Multipath transmission.

Present land-line systems, including microwave links, have been examined from the standpoint of the data transmission performance desired. Test results amply show that these systems are effectively 'out', if not actually out, for times far in excess of the goals set in this program. It would not be practical to pursue these goals as land-lines now perform. Burst noises and particularly drop-outs, i.e., momentary loss of the circuit, are the problems. On any one occurrence these may last from milliseconds to minutes. (Author)

AD-451 658 **Field 17B**
CFSTI Price: HC$15.60
General Electric Co., Daytona Beach, Fla.
INTERFERENCE REDUCTION TECHNIQUES FOR NONLINEAR DEVICES.
Final rept. 15 May 63-15 May 64,
by J. C. Otto, and R. R. Garcia. 15 May 64, 161p
Contract DA-36-039-AMC-02278 (E)
Proj. DA-1G6-2051D-449-01-16

Descriptors: (*Radiofrequency interference, Nonlinear systems), (*Modulators, Radiofrequency interference), (*Frequency multipliers, Radiofrequency interference), Reduction, Phase modulation, Transistors, Varactor diodes, Pumping (Electronics), Feedback, Mixers (Electronics), Amplitude modulation, Mechanical drawings, Electric currents, Phase detectors, Attenuation.

The results of a program directed at reducing interference originating in low level modulators and multipliers is discussed. Five circuits were investigated, namely, the ring modulator, the parametric balanced modulator, the transistor phase modulator, the varactor multiplier, and the feedback modulator. Each of these is discussed in detail. General discussions of three basic techniques for interference reduction are included. These are predistortion, push-pull, and feedback. In addition, a discussion of the general results of the circuit investigation is included. (Author)

AD-457 161 **Field 17B**
CFSTI Price: HC$5.60
CBS Labs., Stamford, Conn.
TRANSDUCER AND INTERPHONE SYSTEM FOR OPERATION IN HIGH-AMBIENT NOISE.
Quarterly progress rept. no. 1, 24 Jun-30 Sep 64.
by A. J. Rosenheck, and Alfred L. DiMattia. 30 Oct 64, 53p
Contract DA-28-043-AMC-00257 (E)
Proj. DA-1G6-41209-D-534-24

Descriptors: (*Voice communication systems, Electroacoustic transducers), (*Electroacoustic transducers, Voice communication systems), Armored vehicles, Military requirements, Vehicles, Noise, Ears, Tolerances (Physiology).

This report describes work performed toward development of a voice communication system for military vehicles. A literature survey of past efforts pertinent to the present program was performed and the results are reported. Two approaches toward picking up speech in high ambient noise are described, namely, the pressure-gradient (noise-cancelling) and contact transducers. Design factors of ear cushions as well as shortcomings of present models are discussed. Criteria for determining maximum safe noise level at the ears is included. A noise study was performed in the M114 and XM577 armored vehicle. Data are presented and conclusions are drawn concerning level and spectrum of the mensured noise. (Author)

AD-634 182 **Field 17B, 9D**
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
SIMULATION OF THE 1% MINIMUM CROSSTALK LOSSES AT VOICE FREQUENCIES IN A PAIRED CABLE BY MEANS OF A LUMPED-PARAMETER NETWORK,
by M. Landis, and D. G. Aviv. Jun 66, 11p P-3379
Prepared in cooperation with Radio Corp of America, N. Y. Communications Systems Lab.

Descriptors: (*Noise (Radio), *Simulators), Reduction, Networks, Design, Interference, Voice communication systems.

Identifiers: Crosstalk.

The design of a crosstalk simulator, which simulates the '1% minimum' crosstalk loss condition in a paired cable at voice frequencies, is presented. The simulator is composed of two or more balanced artificial lines coupled to one another at each node by means of equivalent crosstalk capacitors. The capacitor node connections follow prescribed rules, resulting in the total unbalanced capacitance between the disturbing and disturbed lines varying as a function of the square root of line length (number of sections). The near-end and far-end crosstalk loss calculations obtained with the simulator compare within a fraction of one decibel with the corresponding crosstalk loss evaluation in a smooth cable. Analysis of the simulator model leads to a general result, which can be used for any crosstalk condition specified by (1) the number of disturbers, (2) the magnitude of unbalanced capacitance, (3) signal levels, or (4) the probability of occurrence. The simulator is also useful in evaluation of error rate as a function of crosstalk interference. (Author)

AD-634 281 **Field 17B**
CFSTI Prices: HC$3.00 MF$0.50
IBM Federal Systems Div., Rockville, Md.
AUTOMATIC ALTERNATE ROUTING STUDY.
Quarterly progress rept. no. 6, 1 Oct-31 Dec 65, by S. J. Meyers. 31 Dec 65, 52p
Contract DA-28-043-AMC-00166 (E)
Proj. DA-1E6.34301.D246
Task 1E6.34301.D246.02
ECOM-00166-6

Descriptors: (*Communication systems, Operations research), Automatic, Digital systems, Military requirements.

Identifiers: Field army switched digital communications system.

This report describes a recommended Hybrid System which uses complete-path, real-time routing to subscribers whose locations are known, and saturation signaling when locations are not known. Appendixes A and B contain a description of the algorithm used for computing routes and flow diagrams for the call processing procedure. Appendixes C and D are devoted to the derivation of an analytical representation of a network. (Author)

PB-169 807 **Field 17B, 11F, 7D**
CFSTI Price: HC$6.60
Bell Telephone Labs., Inc., Murray Hill, N. J.
GALVANIC CORROSION IN COMMUNICATION EQUIPMENTS.
Final rept., 15 Sep 51-15 Sep 53.
15 Sep 53, 63p
Contract DA-36-039-sc-15419
Proj. DA-3-93-00-503, SC-32-2005-33 (31310)
AD-25 313

Descriptors: (*Communication equipment, Corrosion), (*Corrosion, Electrolysis), Electrolytes, Films, Test methods, Environmental tests, Humidity, Electrodes, Resistance (Electrical), Electric connectors, Wire.

The galvanic couple corrosion which is produced when two metals of different electrochemical potential are in electrical contact with each other and bridged by a film of conducting electrolytic liquid, was studied by three methods. The potentials of the metals, the corrosion current between specimens and the weight loss have been determined under a number of conditions. The corrosion current method, which was developed in this study, appears to be a valuable tool in making laboratory evaluations of comparative probable corrosion behavior. Measurements of the contact resistance between several combinations of dissimilar metals, indicates that galvanic couple corrosion does not add significantly to the resistance produced by the individual corrosion characteristics of the metals. A galvanic series is proposed, based on corrosion behavior, and recommendations are made as to the conditions under which various couple combinations may be employed in Signal Corps equipment. (Author)

AD-634 162 **See Field 5G**

AD-634 304 **See Field 9B**

AD-634 313 **See Field 15C**

AD-634 378 **See Field 20A**

AD-634 385 **See Field 14D**

AD-634 663 **See Field 9E**

17E. INFRARED AND ULTRAVIOLET DETECTION

AD-634 535 **Field 17E, 20F**
CFSTI Prices: HC$5.00 MF$1.00
Army Missile Command, Redstone Arsenal, Ala. Technical Assistance Div.
BASIC AND ADVANCED INFRARED TECHNOLOGY.
15 Apr 65, 182p

Descriptors: (*Infrared phenomena, Textbooks), (*Infrared detectors, Textbooks), (*Infrared optical materials, Textbooks), (Optics, Infrared research), Guided missiles, Maintenance personnel, Instruction manuals.

The primary purpose of this course is to provide the missile maintenance technician with the basic fundamentals of infrared technology. As of now, the published results on infrared are widely scattered and are often relatively inaccessible and expressed in highly technical language, perhaps understood only by specialists in this field. It is intended that this text will alleviate this condition, as an attempt was made to state the infrared principles as simply and straightforwardly as possible and without detailed argument.

17G. NAVIGATION AND GUIDANCE

AD-634 382 **Field 17G, 1E**
CFSTI Prices: HC$6.00 MF$1.25
North American Aviation, Inc., Columbus, Ohio.
OBSTRUCTION LIGHT SYSTEM.
Final rept.,
by J. L. Conrad. Apr 66, 225p NA65H-788
Contract FAA-ARDS-647
Proj. 430-208-o1E
SRDS-RD-66-4

Descriptors: (*Navigation lights, Design), (*Beacon lights, Design), (*Lighting equipment, Navigation aids), Intensity, Flash lamps, Quartz, Iodides, Environmental tests, Electric motors, Towers.

Identifiers: Quartz-iodide lamps.

The report describes the design, development and fabrication of a prototype high intensity obstruction lighting system. A detailed light source study was made which indicated a newly developed lamp consisting of a quartz-iodide lamp sealed in a parabolic envelope, was the most advantageous type light source. The lamp was operated at less than rated current so that the life was extended to 10,000 hours on the specified operating cycle. In order to obtain the dimming required, the lamps were connected in a series and film disc cutouts were instal'ed so that the burn out of one lamp would not stop current flow in the other lamps. A current regulator was used to maintain the current thru the remaining lamps constant even after some lamp burn outs. The methods utilized in rotation and synchronization are discussed. A stepping motor is used for rotating and a light activated switch arrangement is used for syncronization. The test procedures and test report are included in the report. It is concluded that the light system meets the contract requirements and it is recommended that the F.A.A. accept the light system. (Author)

AD-634 515 **See Field 20K**

AD-634 531 **See Field 8L**

17H. OPTICAL DETECTION

AD-272 647 **Field 17H, 1C, 11C, 5J K**
CFSTI Prices: HC$2.00
Applied Psychological Services, Wayne, Pa.
AIRCRAFT DETECTABILITY AND VISIBILITY: V. DETECTABILITY OF STIMULI COATED WITH FLUORESCENT AND ORDINARY PAINTS; A FURTHER STUDY,
by Philip J. Federman, and Arthur I. Siegel. Dec 61, 47p
Contract N156-38581
NAMC-ACEL-470

Descriptors: (*Paints, Visibility), (*Aircraft, Detection), (*Visibility, Aircraft), Flight crews, Fluorescence, Stimulation, Colors, Visual acuity.

The detectability of various stimuli was investigated in order to provide necessary information for increasing aircraft detectability by visual means. The experiments, conducted in a field visual range situation, involved the following stimuli: fluorescent yellow-orange, fluorescent red-orange (approximating international orange), white, and white with a black medial stripe. The results indicated that the fluorescent yellow-orange stimulus was the most visible under the three meteorological (sky background) conditions involved. The mean threshold data over the three meteorological conditions suggested the following hierarchical order of detectability for the six stimuli: fluorescent yellow-orange, fluorescent red-orange, white, fluorescent red-orange with a white medial stripe, white with a black medial stripe, and ordinary orange. (Author)

AD-634 603 **Field 17H, 5H**
CFSTI Prices: HC$2.00 MF$0.50
Ballistic Research Labs., Aberdeen Proving Ground, Md.
ACCURACY OF TRACKING AIRBORNE TARGETS.
Technical note,
by Edgar A. Murray. Oct 65, 42p BRL-TN-1587
Proj. RDT/E-1P523801A098

Descriptors: (*Optical tracking, Aerial targets), Effectiveness, Tracking telescopes, Lasers, Television display systems, Operators (Personnel), Performance (Human).

Tracking tests of an airborne target were made with a tracking telescope to determine accuracy that could be expected under optimum conditions. The desired accuracy is 0.15 milliradians or better for at least ten per cent of a critical period lasting approximately 15 seconds. Considerable difficulty was experienced in alignment of the relatively low power guiding scope with the main tracking telescope. This problem was solved by inserting a beam splitter, used for fine tracking, in the main optical system. The results show that the target was tracked from 6 per cent to 12 per cent of the critical period. (Author)

PB-169 219. **Field 17H, 1C, 11C, 5J K**
CFSTI Prices: HC$2.00 MF$0.50
Applied Psychological Services, Wayne, Pa.
AIRCRAFT DETECTABILITY AND VISIBILITY: I. VISUAL FIELDS FOR FLUORESCENT AND ORDINARY PAINTS,
by Arthur I. Siegel, and Kenneth Crain. Aug 60, 27p
Contract N156-38581
Proj. TED-NAM-AE-42222-Pt-2
NAMC-ACEL-440, AD-245 849

Descriptors: (*Paints, Visibility), (*Aircraft, Detection), (*Visibility, Aircraft), Flight crews, Visual acuity, Colors, Fluoresence, Stimulation.

A study was made in which the effective stimulus properties of certain fluorescent pigments (red-orange, yellow-orange, and blue) are compared among themselves and with those of 'matching' ordinary pigments and white. Through visual perimetric methods, two points were measured on each of eight meridians: (1) that point at which the stimulus was first seen, usually as a gray object, as it was brought in from the periphery ('Outside Limits' measurement), and (2) that point at which the true color of the test object could be identified ('Inside Limits' measurement). For the yellow-orange fluorescent and its ordinary color counterpart and for white, only the first of these measurements was made. With respect to the Inside Limits zones, the largest visual field was found for fluorescent blue. Ordinary blue, fluorescent red-orange, and ordinary red-orange followed respectively. With respect to the Outside Limits threshold, the fluorescent stimuli as a whole yielded larger average fields than did their ordinary color counterparts. (Author)

AD-634 338 **See Field 5I**

AD-634 680 **See Field 19E**

17I. RADAR DETECTION

AD-427 030 **Field 17I, 9B**
CFSTI Price: HC$3.60
Ohio State Univ. Research Foundation, Columbus. Antenna Lab.
CALCULATION OF TRANSMISSION AND SURFACE-WAVE DATA FOR PLANE MULTILAYERS AND INHOMOGENEOUS PLANE LAYERS,
by Jack H. Richmond. 31 Oct 63, 38p Rept. no. 1751-2
Contract AF 33 (615)-1081
Proj. AF-4161
Task 416103

Descriptors: (*Programming (Computers), Wave transmission), (*Radomes, Electromagnetic properties), Physical properties, Simulation, Propagation, Reflection, Dielectrics, Electromagnetic waves, Polarization, Mathematical analysis, Matrix algebra, Electric fields, Sandwich panels, Electromagnetic wave reflections.

Digital computer programs are given for the transmission and reflection coefficients of low-loss, multilayer, radome sandwiches. Using matrix multiplication, these programs yields design data for parallel and perpendicular polarization in the most efficient manner. Typical data are included for a five-layer sandwich for normal and oblique incidence at frequencies from zero to 40 gigacycles. Matrix multiplication is also employed to calculate the phase velocity of the surface waves which may propagate on a plane multilayer sandwich. Typical results are given for three-layer and five-layer sandwiches. The transmission coefficient of an inhomogeneous plane layer is determined with step-by-step numerical integration of the wave equation. A computer program is included for this problem, along with typical computed data for an exponentially inhomogeneous layer. (Author)

AD-433 757 **Field 17I**
CFSTI Price: HC$1.60
Lincoln Lab., Mass. Inst. of Tech., Lexington.
THE VOLUME COMMON TO TWO INTERSECTING RADAR BEAMS,
by W. R. Crowther. 31 Oct 63, 12p Group rept-62G-8
Contract AF 19 (628)-500
ESD-TDR-63-578

Descriptors: (*Antenna radiation patterns, Radar signals), Communication satellites (Passive), Scattering.

This report describes a refinement in the theoretical calculation of the overall gain of a Project West Ford experiment. In particular, it is a more accurate calculation of the term called Common Volume in the expression for that gain. (Author)

AD-474 285 **Field 17I, 11D, 11B**
CFSTI Prices: HC$2.00 MF$0.50
Rutgers - The State Univ., New Brunswick, N. J. School of Ceramics.
HOMEYCOMB CERAMIC RADOME TECHNIQUES.
Quarterly rept. no. 2, 1 Jul-1 Oct 65,
by E. J. Smoke, H. S. Schroeder, and C. A. Breen. 1 Oct 65, 28p
Contract AF 33 (615)-2623
Proj. AF-4161
Task 416103

Descriptors: (*Radomes, Ceramic materials), (*Ceramic materials, Radomes), (*Honeycomb cores, Radomes), (*Sandwich panels, Radomes), Electromagnetic waves, Propagation, Aluminum compounds, Oxides, Electromagnetic properties.

Identifiers: Alumina.

The object of this effort is to develop processes for making corrugated or cellular 'A' sandwich ojive alumina radomes which will meet a set of preformance requirements. In the first phase, flat test specimens 10 in square will be made to study and evaluate the process and the 'A' sandwich structure. The 'prereacted raw materials' technique is being adapted to prepare the composition as it results in specimens which are 99% of their true density. The 'injection molding of slip' forming method is being used as it is the most promising for the type structures involved. A facility used for the study and making of monolithic ojive alumina radomes is being renovated and adapted to this program. A 92% alumina composition which is stable to 2800F is being prepared by the prereacted raw materials technique. An 'A' sandwich structure has been designed which will result in specimens which are 50% of the weight of a comparable monolithic structure. It consists of four square cells per square inch with all walls at 0.100 in thick in the unfired state. The injection molding of slip die has been received and adapted to the press. The details of its construction and operation are presented herein. The slip supply system and blow-off system are being adapted to the die after which it will be operative. (Author)

AD-634 311 **Field 17I, 4B**
CFSTI Prices: HC$3.00 MF$0.75
Airborne Instruments Lab., Deer Park, N. Y.
PRECISION INTEGRATOR FOR METEOROLOGICAL ECHOES (PRIME).
Final rept., Apr 64-Dec 65,
by Scott F. Hall, and David L. Greenberg. Dec 65, 90p Rept. no. 3940-1
Contract AF 19 (628)-4163
Proj. AF-6672
Task 667201
AFCRL-66-158

Descriptors: (*Meteorological radar, Radar echo areas), (*Integrators (Computers), *Radar echo areas), Weather forecasting, Meteorological parameters, Radar scanning, Data processing systems, Analog computers, Logarithmic amplifiers, Range gating.

Identifiers: PRIME.

The PRecision Integrator for Meteorological Echoes (PRIME) is a versatile range-gated, analog integrator used to estimate the mean reflectivity of the radar returns from clouds and storms. A Log-IF Amplifier converts the returns to the logarithm of the signal amplitude. The range resolution is selectable in seven steps from 0.05 to 0.8 statute mile, with a variable start of range. Contiguous range integration is also included in the same seven steps. The time of integration in all range elements is continuously variable from 5 to 500 msec by a single control. In addition to reflectivity, the output may represent other significant meteorological parameters at the operator's choice. The PRIME equipment has a dynamic range of 80 db. PRIME will operate with any conventional radar having PRF's from 200 to 5000 pps and pulse widths from 0.5 to 6 micro sec. (Author)

AD-634 564 **Field 17I, 9D**
CFSTI Prices: HC$1.00 MF$0.50
Stanford Univ., Calif. Stanford Electronics Lab.
DIGITAL DETECTION OF BINARY CODED RADAR SIGNALS,
by Philip M. Spira. Jan 66, 17p Scientific-2, SU-SEL-66-001
Contract AF 19 (628)-3996
Proj. AF-8628
Task 862808
AFCRL-66-253

Descriptors: (*Radar tracking, Pseudo-random systems), Detection, Radar signals, Coding, Binary arithmetic, Digital systems, Data processing systems, Target acquisition.

This report describes a method for locating one or two radar targets using pseudo random coding and digital processing of the return signal. The process time required is twice that of a matched filter, but instrumentation is simpler. If two targets are present, they are resolved proportional to the strength of their echoes in the high noise case, provided their relative phase is slowly varying. (Author)

AD-634 742 **Field 17I, 14C, 9E**
CFSTI Prices: HC$1.00 MF$0.50
Navy Electronics Lab., San Diego, Calif.
RADAR-SIGNALS CONVERTER.
Research and development rept. Sep 65-Jan 66,
by R. A. Turner. 22 Apr 66, 25p NEL-1373
Proj. SS-191-003
Task 6013 (NEL N40361)

Descriptors: (*Radar signals, *Magnetic recording systems), Video signals, Television recording systems, Mixers (Electronic), Wiring diagrams.

An equipment has been developed at NEL that combines radar video and trigger signals for recording and separates them for playback. It minimizes noise-generated false trigger signals in manual and automatic noise-rejection modes of operation. With another module, an NEL synchro-tape-synchro converter, the radar-signals converter transforms the RCA TR4-CVR television recorder previously procured by NEL into a radar recorder. (Author)

AD-634 362 **See Field 4B**

PB-169 995 **See Field 14B**

17J. SEISMIC DETECTION

AD-444 492 **See Field 8K**

18. NUCLEAR SCIENCE AND TECHNOLOGY

BNL-929 **Field 18**
CFSTI Prices: HC$6.00 MF$1.25
Brookhaven National Lab., Upton, N. Y.
ANNUAL REPORT, JULY 1, 1965.
Nov 65, 249p
Contract AT (30-2)-GEN-16

Descriptors: (*Nuclear physics, Scientific research), (*Nuclear engineering, Reports).

For abstract, see T 66 15.

TID-22771 **Field 18-, 5B**
CFSTI Prices: HC$2.50 MF$0.75
Oak Ridge National Lab., Tenn.
NUCLEAR THEORY INDEX FOR 1964,
by M. J. Martin, and H. Ogata. 1964, 97p
Contract W-7405-eng-26

Descriptors: (*Nuclear physics, Theory), (*Indexes, Nuclear physics).

For abstract, see N 20 12.

UCRL-14538 **Field 18-, 20H**
CFSTI Prices: HC$3.00 MF$0.75
Lawrence Radiation Lab., Univ. of California, Livermore.
PHYSICS DEPARTMENT PROGRESS REPORT, JUNE-SEPTEMBER 1965.
Sep 65, 82p
Contract W-7405-eng-48

Descriptors: (*Nuclear physics, Thermodynamics), (*Scientific research, Nuclear physics).

For abstract, see N 20 13.

UCRL-16580 **Field 18-, 7**
CFSTI Prices: HC$6.00 MF$1.50
Lawrence Radiation Lab., Univ. of California, Berkeley.
NUCLEAR CHEMISTRY DIVISION ANNUAL REPORT, 1965,
by J. M. Hollander, and F. Reynolds. Jan 66, 291p
Contract W-7405-eng-48

Descriptors: (*Nuclear physics, Chemistry), (*Chemical reactions, Nuclear physics).

For abstract, see N 20 13.

18A. FUSION DEVICES (THERMONUCLEAR)

LA-3437 **Field 18A, 12A**
CFSTI Prices: HC$2.00 MF$0.50
Los Alamos Scientific Lab., Univ of California, N. Mex.
SPHERICAL HARMONIC REDUCTION OF THE FOKKER-PLANCK EQUATION,
by Thomas A. Oliphant Jr. Aug 65, 40p
Contract W-7405-eng-36

Descriptors: (*Thermonuclear reactions, Special functions (Mathematics)), (*Plasma physics, Magnetic pinch).

LA-3442 **Field 18A, 20I**
CFSTI Prices: HC$1.00 MF$0.50
Los Alamos Scientific Lab., Univ. of California, N. Mex.
STABILITY OF A BUMPY LINEAR, BETA YIELDS 1, THETA-PINCH,
by Richard L. Morse. 20 Nov 65, 17p
Contract W-7405-eng-36

Descriptors: (*Thermonuclear reactions, Plasma medium), (*Plasma physics, Stability).

Identifiers: Theta pinch.

ORNL-3908 **Field 18A, 20I**
CFSTI Prices: HC$5.00 MF$1.00
Oak Ridge National Lab., Tenn.
THERMONUCLEAR DIVISION SEMIANNUAL PROGRESS REPORT FOR PERIOD ENDING OCTOBER 31, 1965.
Mar 66, 172p
Contract W-7405-eng-26

Descriptors: (*Thermonuclear reactions, Scientific reports), (*Plasma physics, Thermonuclear reactions).

UCRL-14285 **Field 18A, 20I**
CFSTI Prices: HC$4.00 MF$1.00
Lawrence Radiation Lab., Univ. of California, Livermore.
CONTROLLED THERMO-NUCLEAR RESEARCH.
Semiannual rept. Jan-Jun 65, 1965, 128p
Contract W-7405-ENG-48

Descriptors: (*Thermonuclear reactions, Scientific research), (*Plasma physics, Thermonuclear reactions).

18B. ISOTOPES

AD-634 295 **Field 18B, 20H**
CFSTI Prices: HC$2.00 MF$0.50
Stanford Univ., Calif.
CHARGE STRUCTURE OF THE CALCIUM ISOTOPES,
by B. F. Gibson, and K. J. van Oostrum. May 66, 39p ITP-215, HEPL-441
Contracts AF 49 (638)-1389, Nonr-225 (67)
Research supported in part by NSF, grant NSF-GP-948.

Descriptors: (*Calcium, *Nuclear structure), (*Stable isotopes, *Nuclear energy levels), Nuclear shell models, Potential theory, Electrons, Nuclear scattering, Nuclear cross sections, Elastic scattering.

Phenomenological models of the ground state charge densities of the calcium isotopes Ca40,44,48 exhibit both an increase in the half-radius which is less than one would expect from a simple A exp. 1/3 estimate and an uneven variation in the skin thickness. A simple shell model of the nucleus with a Woods-Saxon potential is presented which can produce charge densities leading to electron scattering cross sections which agree with experiment as well as the phenomenological analyses. Strong closed shell effects are found in the parameters describing the potential half-radius and skin thickness. (Author)

BMI-1757 **Field 18B, 18J**
CFSTI Prices: HC$2.00 MF$0.50
Battelle Memorial Inst., Columbus, Ohio.
PROGRESS RELATING TO CIVILIAN APPLICATIONS DURING JANUARY, 1966,
by Donald L. Keller. 1 Feb 66, 30p
Contract W-7405-eng-92

Descriptors: (*Nuclear industrial applications, Reactor materials), (*Reactor fuels, Fuel burn up).

For abstract, see T 66 15.

DP-1015 **Field 18B, 18L**
CFSTI Prices: HC$2.00 MF$0.50
Du Pont De Nemours (E. I.)0 and Co., Aiken, S. C. Savannah River Lab.
RADIOISOTOPE PRODUCTION CAPABILITIES OF U. S. POWER REACTORS,
by Edward J. Hennelly, and Ramon Hood. Nov 65, 23p
Contract AT (07-2)-1

Descriptors: (*Power reactors, Radioactive isotopes), (*Radioactive isotopes, Production).

NBL-231 **Field 18B, 18J**
CFSTI Prices: HC$4.00 MF$1.00
New Brunswick Lab. (AEC), N. J.
EVALUATION OF THE METHODS IN TID-7029, 'SELECTED MEASURMENT METHODS FOR PLUTONIUM AND URANIUM IN THE NUCLEAR FUEL CYCLE',
by M. W. Lerner. 15 Feb 66, 132p

Descriptors: (*Reactor fuel elements, Uranium), (*Isotope separation, Plutonium).

NYO-10175 **Field 18B**
CFSTI Prices: HC$4.00 MF$1.00
Union Carbide Corp., Tuxedo, N. Y. Nuclear Div.
RESEARCH IN ACTIVATION ANALYSIS.
Final rept. 1 Aug 63-31 Oct. 64,
by H. Arino, H. H. Kramer, V. J. Molinski, R. S. Tilbury, and W. H. Wahl. 31 Dec 64, 130p
Contract AT (30-1)-2975

Descriptors: (*Radiochemistry, Neutron activation), (*Neutron activation, Nuclear industrial applications).

NYO-2757-5 **Field 18B**
CFSTI Prices: HC$3.00 MF$0.75
Parametrics, Inc., Waltham, Mass.
DEVELOPMENT OF 85 KR AS A UNIVERSAL TRACER. EXTENSION OF PHASE III. AREAS OF APPLICATION.
Rept. for 1 Nov 63-31 Oct 64,
by David Chleck, Richard Maehl, and Orlando Cucchiara. Feb 66, 64p
Contract AT (30-1)-2757

Descriptors: (*Tracer studies, Krypton), (*Krypton, Radioactive isotopes).

ORNL-IIC-6 **Field 18B, 5C**
CFSTI Prices: HC$3.00 MF$0.75
Oak Ridge National Lab., Tenn.
LIST OF AEC RADIOISOTOPE CUSTOMERS WITH SUMMARY OF RADIOISOTOPE SHIPMENTS, FY 1965,
by P. S. Baker. Mar 66, 75p
Contract W-7405-eng-26

Descriptors: (*Radioactive isotopes, Nuclear industrial applications), (*Fission products, Transportation).

ORNL-IIC-7 **Field 18B**
CFSTI Prices: HC$2.00 MF$0.75
Oak Ridge National Lab., Tenn.
PROCEEDINGS OF INFORMATION MEETING ON IRRADIATED WOOD-PLASTIC MATERIALS HELD AT CONRAD HILTON HOTEL, CHICAGO, ILLINOIS, SEPTEMBER 15, 1965,
by Ralph E. Green, and Philip S. Baker. Apr 66, 123p CONF-650960
Contract W-7405-eng-26

Descriptors: (*Wood, Radioactive isotopes), (*Plastics, Wood).

For abstract, see N 20 12.

UH-235P5-1 **Field 18B, 6H, 6C**
CFSTI Prices: HC$3.00 MF$0.75
Hawaii Univ., Honolulu. Coll. of Tropical Agriculture.
DOSIMETRY, TOLERANCE, AND SHELF LIFE EXTENSION RELATED TO DISINFESTATION OF FRUIT AND VEGETABLES BY GAMMA IRRADIATION.
Annual rept. 1 Jun 64-31 May 65,
by E. Akamine, J. Brewbaker, C. Cavaletto, D. Hilker, and M. Lin. Jun 65, 78p
Contract AT (04-3)-235

Descriptors: (*Irradiated foods, Gamma rays), (*Nuclear industrial applications, Irradiated foods).

Y-1532 **Field 18B, 7E, 7D**
CFSTI Prices: HC$1.00 MF$0.50
Union Carbide Corp., Oak Ridge, Tenn. Y-12 Plant.
SPECTROGRAPHIC DETECTION OF TRACE ELEMENTS IN ALUMINUM METAL,
by O. P. Killeen. 5 May 66, 15p
Contract W-7405-eng-26

Descriptors: (*Tracer studies, Aluminum), (*Labeled substances, Spectroscopy).

For abstract, see N 20 13.

ALO-1355-1 **See Field 18D**

ANL-7096 **See Field 7E**

BNL-949 **See Field 7E**

MLM-1268 **See Field 7E**

MLM-1297 **See Field 10B**

ORNL-3900 **See Field 7E**

TID-22499 **See Field 8F**

TID-22509 **See Field 6H**

18C. NUCLEAR EXPLOSIONS

AD-634 674 **Field 18C**
CFSTI Prices: HC$1.00 MF$0.50
Army Engineer Research and Development Labs., Fort Belvoir, Va.
A THEORY OF SHOCK INTERACTIONS FOR MULTIPLE UNDERGROUND NUCLEAR EXPLOSIONS AND THE RESULTING HYPOTHETICAL CRATER VOLUMES,
by Russell Eaton III. Jun 66, 15p
Presented to the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Shock waves, Theory), (*Nuclear explosions, Underground explosions), (*Cratering, Nuclear explosions), Mathematical prediction.

For abstract, see T 66 15.

AD-634 691 **Field 18C, 13M, 13C**
CFSTI Prices: HC$1.00 MF$0.50
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
MATERIALS FOR USE IN MITIGATING BLAST LOADS ON DEEPLY BURIED PROTECTIVE STRUCTURES,
by George C. Hoff. Jun 66, 15p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Underground structures, *Materials), (*Blast, Underground structures), Concrete, Expanded plastics, Honeycomb cores, Glass, Loading (Mechanics), Shock (Mechanics), Nuclear explosion damage, Construction.

The behavior of a buried structure subjected to blast loading must be evaluated on the basis of the loads reaching the structure. Research has shown that the use of a properly designed backpacking material placed around the structure dissipates a portion of the shock energy present in the free field, thereby reducing the magnitude of the forces reaching the structure. The response of the backpacking then and that of the structure are completely interdependent, and the design of one cannot be considered without the design of the other. Based on the results of laboratory research, three materials-- (a) a naturally occurring friable aggregate, (b) a foamed plastic, and (c) an insulating concrete--are currently being utilized in a prototype experiment to evaluate their shock-dissipating and stress-transfer characteristics. The results of this experiment along with other factors such as cost, availability, and ease of placement will enlighten the future outlook for backpacking materials placed around buried structures. (Author)

UCRL-14431 **Field 18C, 19A, 20D, 9B**
CFSTI Prices: HC$1.00 MF$0.50
Lawrence Radiation Lab., Univ. of California, Livermore.
THE USE OF ONE-AND TWO-DIMENSIONAL HYDRODYNAMIC MACHINE CALCULATIONS IN HIGH EXPLOSIVE RESEARCH,
by Mark. L. Wilkins. 29 Oct 65, 15p
Contract W-7405-ENG-48

Descriptors: (*Hydrodynamics, Programming (Computers)), (*Explosive materials, Detonations).

For abstract, see T 66 15.

UCRL-14487 (REV.1) **Field 18C, 8K**
CFSTI Prices: HC$1.00 MF$0.50
Lawrence Radiation Lab., Univ. of California, Livermore.
THE SALMON SEISMIC EXPERIMENT,
by Gleen Werth, and Philip Randolph. 15 Nov 65, 17p
Contract W-7405-ENG-48

Descriptors: (*Seismic waves, Propagation), (*Nuclear explosions, Seismic waves).

Identifiers: Salmon.

AD-450 999 **See Field 14B**

LA-1981 **See Field 18H**

18D. NUCLEAR INSTRUMENTATION

ACNP-65503 **Field 18D**
CFSTI Prices: HC$6.00 MF$1.50
Allis-Chalmers Mfg. Co., Bethesda, Md. Atomic Energy Div.
FINAL HAZARDS REPORT FOR THE RCPA ELK RIVER REACTOR.
14 Jan 65, 298p
Contract AT (11-1)-654

Descriptors: (*Nuclear power plants, Reactor operation), (*Reactor hazards, Radiation measurement systems).

AD-463 130 **Field 18D**
CFSTI Price: HC$2.60
Naval Radiological Defense Lab., San Francisco, Calif.
COMPUTER CORRECTION FOR SHIFTS IN GAIN AND BASELINE IN GAMMA-RAY SCINTILLATION PULSE HEIGHT SPECTRA,
by David F. Covell. 2 Feb 65, 12p USNRDL-TR-832
Proj. ONR-R-001-01

Descriptors: (*Gamma-ray spectroscopy, Mathematical analysis), (*Scintillation counters, Experimental data), Pulse height analyzers, Gain, Radioactive isotopes, Titanium, Standards, Computers.

In the quantitative analysis of multicomponent pulse height spectral data, precision depends upon (1) the statistical variation inherent in the radioactive decay process, (2) statistical variations in the detection process, and (3) instrumental variations. The nature of the statistical variations in categories 1 and 2 are well understood but category 3 variations are more difficult to evaluate and correct. The main variations observed in this category are of gain and baseline. In order to determine the instrumental conditions that prevail at the time of measurement, the spectrum of a standard (Ti44) was obtained immediately before experimental spectra were obtained. This standard spectrum was then compared to a reference standard spectrum to obtain estimates of gain and baseline status, and appropriate corrections were applied to the experimental data. This technique, which can correct for shifts in both baseline and gain in excess of one channel (with respect ot channel 256 of a 256-channel system), is capable of making corrections of as little as 1/20 of a channel. Improvement in the resultant quantitative estimation of the constituents of multicomponent pulse height spectra is demonstrated. (Author)

AD-634 621 **Field 18D, 18L**
CFSTI Prices: HC$1.00 MF$0.50
Army Engineer Reactors Group, Fort Belvoir, Va.
GAMMA-INDUCED SENSITIVITY LOSS IN THE PROPORTIONAL COUNTERS OF A NUCLEAR POWER PLANT,
by James K. McNally. Jun 66, 15p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Proportional counters, Sensitivity), (*Nuclear power plants, Proportional counters), Gamma rays, Gamma-neutron reactions, Boron, Boron compounds, Fluorides, Pulse height analyzers, Signal-to-noise ratio.

Identifiers: SM-1 army package power reactor, Boron fluorides.

CONCLUSIONS: Sensitivity of both the B-10 lined and BF3 filled proportional counters depends strongly upon the gamma flux intensity in which the detector is operating. Loss of sensitivity occurs because of a reduction in pulse height as gamma flux increases. Pulses produced by neutrons and by gamma rays are both reduced in height; therefore, a low discriminator bias may be used to minimize sensitivity loss without counting gamma pulses. Magnitude of the sensitivity loss was approximately the same for the B-10 lined and BF3 filled detector types. Characteristics of the voltage plateau change dramatically with a change in gamma flux. Upper and lower ends of the voltage plateau shift to higher voltages as the gamma flux is increased. (Author)

AD-634 684 **Field 18D, 20L**
CFSTI Prices: HC$1.00 MF$0.50
Army Nuclear Defense Lab., Edgewood Arsenal, Md.
SUPERCONDUCTING THIN-FILM NUCLEAR-PARTICLE DETECTORS,
by James B. Greer, Donald B. Sullivan, and Walter R. Van Antwerp. Jun 66, 14p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Radiation measurement systems, *Superconductors), (*Metal films, Radiation measurement systems), (*Alpha particle detectors, Superconductors), Tin, Vapor plating, Thermodynamics, Resistance (Electrical).

It was found that a thin superconducting film can be used as a detector of nuclear particles. Although the potential speed and noise advantages have not been fully realized, the results obtained are thought to be very promising and in no way suggest that these sought-after advantages may not be attainable. (Author)

AD-634 718 **Field 18D, 20L**
CFSTI Prices: HC$4.00 MF$0.75
Solid State Rdiations, Inc., Los Angeles, Calif.
DEVELOPMENT, TESTING AND EVALUATION OF GERMANIUM NUCLEAR PARTICLE DETECTORS.
Final rept.,
by H. S. Katzenstein, and F. P. Ziemba. Jun 66, 110p
Contract DA-18-108-AMC-142 (A)
NDL-TR-76

Descriptors: (*Germanium, *Nuclear radiation spectrometers), Solid state physics, Nuclear particles, Radiation measurement systems, Nuclear spectroscopy, Neutron detectors, Silicon, Lithium, Sandwich construction, Electronic equipment, Wiring diagrams.

Results are presented of a study of some of the properties of thin-window germanium nuclear-particle detectors which were fabricated by use of the surface barrier lithium-ion-drift techniques. Emphasis was placed on the development of germanium-particle detectors that were suitable for application in the neutron spectrometer which employs the Li (6) sandwich technique. The study resulted in (1) a fabrication procedure for the production of these devices, (2) a preamplifier for germanium detectors, (3) a cooling system for the germanium detectors, (4) an improved electronic system, utilizing nanosecond electronics, for the Li (6) spectrometer, (5) some general comparisons between silicon and germanium detectors, (6) qualitative information on the fast-neutron-induced reaction in silicon and germanium and (7) preliminary data on the response of a neutron spectrometer using thin-window silicon and germanium nuclear-particle detectors. (Author)

ALO-1355-1 **Field 18D, 7E, 18B**
CFSTI Prices: HC$6.00 MF$1.25
Colorado School of Mines Research Foundation, Inc., Golden.
EVALUATION OF LARGE VOLUME DETECTORS AND THEIR APPLICATIONS TO RADIOISOTOPE PROCESS CONTROL.
26 May 65, 213p
Contract AT (29-2)-1355

Descriptors: (*Radiation measurement systems, Tracer studies), (*Tracer studies, Radiation measurement systems).

For abstract, see N 20 13.

ANL-7108 **Field 18D, 20G, 20H**
CFSTI Prices: HC$4.00 MF$0.75
Argonne National Lab., Ill.
PHYSICS DIVISION SUMMARY REPORT, APRIL-DECEMBER 1965.
Dec 65, 118p
Contract W-31-109-eng-38

Descriptors: (*Nuclear physics, Reports).

For abstract, see N 20 13.

ANL-7152 **Field 18D, 20H, 18I, 18J K**
CFSTI Prices: HC$4.00 MF$0.75
Argonne National Lab., Ill.
REACTOR DEVELOPMENT PROGRAM REPORT, JANUARY 1966.
24 Feb 66, 105p
Contract W-31-109-ENG-38

Descriptors: (*Liquid metal cooled reactors, Reactor fuels), (*Fast reactors, Reactor materials).

DP-834 **Field 18D, 18I**
CFSTI Prices: HC$1.00 MF$0.50
Du Pont De Nemours (E.I.) and Co., Aiken, S. C. Savannah River Lab.
DEVELOPMENT OF A TEMPERATURE MONITOR FOR LARGE REACTORS,
by Arthur H. Dexter, Carl R. Hutter, Malcolm H. Goosey, Richard W. Leep, and John N. Wilson. Mar 66, 18p
Contract AT (07-2)-1

Descriptors: (*Radiation monitors, Radiation measurement systems), (*Temperature, Radiation monitors).

IDO-17104 **Field 18D, 18K**
CFSTI Prices: HC$3.00 MF$0.75
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
NUCLEAR TECHNOLOGY BRANCHES QUARTERLY REPORT, JANUARY 1-MARCH 31 1965.
Dec 65, 80p
Contract AT (10-1)-205

Descriptors: (*Test reactors, Nuclear engineering), (*Reactor materials, Test reactors).

IDO-17134 Field 18D
CFSTI Prices: HC$2.00 MF$0.50
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
COMPILATION OF RESOLUTIONS AND INTENSITIES OF SLOW NEUTRON, INELASTIC SCATTERING, TIME-OF-FLIGHT INSTRUMENTS,
by R. M. Brugger, and Y. D. Harker. Jan 66, 45p
Contract AT (10-1)-205

Descriptors: (*Thermal neutrons, Inelastic scattering), (*Inelastic scattering, Instrumentation).

IDO-17148 Field 18D
CFSTI Prices: HC$3.00 MF$0.50
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
TRANSDUCER DEVICE EVALUATION USING HIGH EXPLOSIVES,
by R. H. Meservey. Apr 66, 53p
Contract AT (10-1)-205

Descriptors: (*Transducers, Explosion effects).

For abstract, see N 20 13.

LA-3443 Field 18D, 11F
CFSTI Prices: HC$1.00 MF$0.50
Los Alamos Scientific Lab., Univ. of California, N. Mex.
FABRICATION OF PRECISION LEAD COLLIMATORS,
by Hermann M. Ruess. Sep 65, 16p
Contract W-7405-eng-36

Descriptors: (*Collimators, Precision finishing), (*Radiation measurement systems, Collimators).

LA-3446 Field 18D, 6R
CFSTI Prices: HC$2.00 MF$0.50
Los Alamos Scientific Lab., Univ. of California, N. Mex.
GAMMA DOSE RATE MEASUREMENTS - KIWI TRANSIENT NUCLEAR TEST,
by Fred W. Sanders. Dec 65, 30p
Contract W-7405-eng-36

Descriptors: (*Gamma rays, Dose rate), (*Dose rate, Radiation measurement systems).

LA-3479 Field 18D, 20G, 20H
CFSTI Prices: HC$3.00 MF$0.75
Los Alamos Scientific Lab., Univ. of California, N. Mex.
QUARTERLY STATUS REPORT ON THE MEDIUM-ENERGY PHYSICS PROGRAM FOR PERIOD ENDING JANUARY 31, 1966.
Feb 66, 77p
Contract W-7405-ENG-36

Descriptors: (*Proton accelerators, Instrumentation), (*Linear accelerators, Protons).

NAA-SR-11356 Field 18D, 18K
CFSTI Prices: HC$4.00 MF$1.00
Atomics International, Canoga Park, Calif.
NEUTRON FLUX MONITORING WITH ARGON GAS.
Final rept.,
by C. R. F. Smith, and A. J. Saur. 25 Mar 66, 135p

Contract AT (11-1)-GEN-8

Descriptors: (*Neutron flux, Radiation monitors), (*Radiation monitors, Argon).

NAA-SR-11762 Field 18D, 18N
CFSTI Prices: HC$2.00 MF$0.50
Atomics International, Canoga Park, Calif.
DEVELOPMENT OF A SOLID-STATE NEUTRON DETECTOR FOR SNAP-10A,
by A. Chesavage. 25 Mar 66, 40p
Contract AT (11-1)-GEN-8

Descriptors: (*Auxiliary power plants, Neutron detectors), (*Neutron detectors, Solid state physics).

NYO-10742 Field 18D
CFSTI Prices: HC$6.00 MF$1.25
Nuclear Metals, West Concord, Mass.
INVESTIGATION OF BERYLLIUM WINDOWS FROM CEA BUBBLE CHAMBER.
Final rept,
by J. L. Klein, and J. J. Pickett. 31 Dec 65, 233p
Contract AT (30-1)-3600

Descriptors: (*Bubble chambers, Beryllium), (*Non-destructive testing, Radiation measurement systems).

ORNL-3915 Field 18D, 18F, 18G
CFSTI Prices: HC$5.00 MF$1.00
Oak Ridge National Lab., Tenn.
NUCLEAR SAFETY PROGRAM SEMIANNUAL PROGRESS REPORT FOR PERIOD ENDING DECEMBER 31, 1965.
Mar 66, 154p
Contract W-7405-eng-26

Descriptors: (*Reactor safety systems, Containment), (*Reactor system components, Fission products).

For abstract, see N 20 12.

ORNL-3929 Field 18D
CFSTI Prices: HC$2.00 MF$0.50
Oak Ridge National Lab., Tenn.
PARALLEL-PLATE MULTISECTION IONIZATION CHAMBERS FOR HIGH-PERFORMANCE REACTORS,
by D. P. Roux. Apr 66, 19p
Contract W-7405-eng-26

Descriptors: (*Ionization chambers, Nuclear reactors), (*Radiation measurement systems, Ionization chambers).

For abstract, see N 20 12.

PB-169 890 Field 18D, 20H
CFSTI Prices: HC$5.60 MF$0.50
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
TRAITEMENT DES INFORMATIONS ISSUES D'UN SPECTROMETRE (Processing of Data Issued from Gamma Spectrometer),
by Jean-Pierre Boulanger. Mar 66, 56p CEA-R-2991
Text in French; Attached Summary in English.

Descriptors: (*Gamma-ray spectroscopy, Data processing systems), Least squares method, Absorption spectrum, Quantitative analysis, Flow charting, Programming (Computers), France.

Purpose of the report is the study of computation methods applied to analysis by gamma spectrometry. Quantitative analysis by the least-squares method, improved by a gain-shift correction is studied. Then the single full-energy peaks and the resolution of complex peaks are dealt with. In both cases, the calculation principle, then the systematic tests realized in order to prove their validity and determine their application ranges, are described, and finally some experimental results appropriate to illustrate their possibility are presented. (Author)

PB-169 983 Field 18D, 20L
CFSTI Price: HC$5.60
Naval Radiological Defense Lab., San Francisco, Calif.
SUMMARY OF THE INVESTIGATION OF THE RESPONSE OF CADMIUM SULFIDE,
by L. D. Miller, and A. J. Jaske. 19 Dec 60, 52p
TR-491
AD-251 053

Descriptors: (*Radiation measurement systems, Gamma rays), (*Cadmium compounds, Crystal growth), Crystal detectors, Photoconductivity, Semiconductors, Sulfides.

Previous investigations to develop photoconducting cadmium sulfide crystals for use as gamma-radiation detectors were not successful in producing crystals which would meet the desired military specifications for operational instruments. This investigation has tried to correlate the gamma response to the incident-light response in the visible and near visible parts of spectrum and at the same time obtain greater knowledge of the physical properties responsible for the changes in the conductivity of the cadmium sulfide crystals. No definite correlation was found. Further investigation is necessary to produce the desired crystals. (Author)

RFP-602 ield 18D
CFSTI Prices: HC$2.00 MF$0.50
Rocky Flats Div., Dow Chemical Co., Golden, Colo.
THIN FILM EVAPORATION RATE M-ONITOR,
by T. Van Vorous, G. E. Hart, J. L. Martinez, and R. L. Beno. 17 Feb 66, 21p
Contract AT (29-1)-1106

Descriptors: (*Thin films (Storage devices), Monitors), (*Monitors, Evaporation).

RFP-636 Field 18D
CFSTI Prices: HC$1.00 MF$0.50
Rocky Flats Div., Dow Chemical Co., Golden, Colo.
A PRECISION BACK-REFLECTION LAUE CAMERA,
by A. W. Brewer, and R. R. McDonald. 19 Jan 66, 7p
Contract AT (29-1)-1106

Descriptors: (*Cameras, Crystallography), (*Metallography, Photographic analysis).

RFP-644 Field 18D, 7D
CFSTI Prices: HC$2.00 MF$0.50
Rocky Flats Div., Dow Chemical Co., Golden, Colo.
EVALUATION OF DIRECT READING ATTACHMENT FOR EMISSION SPECTROGRAPH,
by H. N. Barton, and E. Vejvoda. 21 Apr 66, 43p
Contract AT (29-1)-1106

Descriptors: (*Emissivity, Spectroscopy), (*Spectral lines, Reading).

For abstract, see N 20 13.

RFP-657 Field 18D
CFSTI Prices: HC$1.00 MF$0.50
Rocky Flats Div., Dow Chemical Co., Golden, Colo.
IMPROVED ELECTRODELESS TOROIDAL CONDUCTIVITY ANALYZER,
by C. M. Johnson, and G. E. Hart. 11 Feb 66, 17p
Contract AT (29-1)-1106

Descriptors: (*Conductivity, Analysis), (*Solutions, Conductivity).

RFP-690 Field 18D
CFSTI Prices: HC$1.00 MF$0.50
Rocky Flats Div., Dow Chemical Co., Golden, Colo.
CONDUCTANCE DEVICE FOR MONITORING THIN FILM GROWTH,
by G. E. Hart, J. L. Martinez, and R. L. Beno. 11 Mar 66, 12p
Contract AT (29-1)-1106

Descriptors: (*Metal films, Conductivity), (*Radiation monitors, Metal films).

For abstract, see N 20 12.

SCL-DC-65-112 **Field 18D, 12A, 9E**
CFSTI Prices: HC$2.00 MF$0.50
Sandia Corp., Albuquerque, N. Mex.
THE AUTOMATIC, ADAPTIVE, SERVO CONTROL FOR STOCHASTIC PROCESSES,
by D. F. Hillyer Jr. Feb 66, 42p
Contract AT (29-1)-789

Descriptors: (*Stochastic processes, Control simulators), (*Servomechanisms, Statistical tests).

UCRL-14602 **Field 18D, 9A**
CFSTI Prices: HC$1.00 MF$0.50
Lawrence Radiation Lab., Univ. of California, Livermore.
DETECTION AND DIAGNOSIS OF MALFUNCTIONS IN STRAIN GAGE SYSTEMS,
by Robert L. Osborne. 14 Dec 65, 14p
Contract W-7405-eng-48

Descriptors: (*Strain gages, Malfunctions), (*Electric bridges, Electric cables).

For abstract, see N 20 12.

UCRL-16480 **Field 18D**
CFSTI Prices: HC$1.00 MF$0.50
Lawrence Radiation Lab., Univ. of California, Berkeley.
A METHOD OF MAKING THIN-WINDOW GERMANIUM DETECTORS,
by Fred S. Goulding, and Blair V. Jarrett. 17 Jan 66, 9p
Contract W-7405-eng-48

Descriptors: (*Radiation measurement systems, Germanium), (*Semiconductors, Radiation measurement systems).

UCRL-16511 **Field 18D, 20G, 20H, 18G**
CFSTI Prices: HC$3.00 MF$0.75
Lawrence Radiation Lab., Univ. of California, Berkeley.
PHYSICS DIVISION SEMIANNUAL REPORT, MAY-OCTOBER 1965.
10 Nov 65, 62p
Contract W-7405-eng-48

Descriptors: (*Elementary particles, Accelerators), (*Radioactivity, Radiation measurement systems).

Y-1506 **Field 18D**
CFSTI Prices: HC$2.00 MF$0.50
Union Carbide Corp., Oak Ridge, Tenn. Y-12 Plant.
POSITION MONITORING DEVICES,
by L. G. Whitten. 20 Apr 66, 32p
Contract W-7405-eng-26

Descriptors: (*Radiation monitors, Positioning devices (Machinery)), (*Positioning devices (Machinery), Lasers).

For abstract, see N 20 12.

ANL-7113 **See Field 7D**

BMI-1765 **See Field 11F**

BNWL-36 **See Field 7E**

CONF-650922 **See Field 20G**

LA-3397 **See Field 6R**

LA-3423 **See Field 7D**

MLM-1263 **See Field 9B**

SC-RR-65-491 **See Field 6R**

SC-RR-65-502 **See Field 9B**

UCRL-14359 **See Field 7D**

UCRL-14534 **See Field 6R**

UCRL-16613 **See Field 6R**

18E. NUCLEAR POWER PLANTS

ACNP-64015 **Field 18E**
CFSTI Prices: HC$4.00 MF$1.00
Allis-Chalmers Mfg. Co., Bethesda, Md. Atomic Energy Div.
PATHFINDER ATOMIC POWER PLANT. FUEL HANDLING AND TRANSFER SYSTEM DEVELOPMENT.
28 Sep 64, 122p
Contract AT (11-1)-589

Descriptors: (*Reactor fuels, Handling), (*Nuclear power plants, Reactor fuels).

ACNP-64016 **Field 18E**
CFSTI Prices: HC$3.00 MF$0.75
Allis-Chalmers Mfg. Co., Bethesda, Md. Atomic Energy Div.
PATHFINDER ATOMIC POWER PLANT. BOILER FUEL ELEMENT DESIGN REPORT,
by D. A. Patterson, W. J. Soverson, and D. R. Roberts.8 Jan 65, 98p
Contract AT (11-1)-589

Descriptors: (*Reactor fuel elements, Nuclear power plants), (*Boilers, Reactor fuel elements).

ACNP-64568 **Field 18E**
CFSTI Prices: HC$2.00 MF$0.50
Allis-Chalmers Mfg. Co., Bethesda, Md. Atomic Energy Div.
ELK RIVER REACTOR OPERATIONS ANALYSIS PROGRAM. TOPICAL REPORT, CONTROL ROD ANALYSIS, TASK 204,
by J. R. Fisher, C. Ho, and N. Audi. Jul 64, 38p
Contract AT (11-1)-135
Task 204

Descriptors: (*Reactor operation, Nuclear power plants), (*Reactor control, Reactor system components).

ACNP-64601 **Field 18E**
CFSTI Prices: HC$2.00 MF$0.50
Allis-Chalmers Mfg. Co., Bethesda, Md. Atomic Energy Div.
PATHFINDER ATOMIC POWER PLANT. PATHFINDER BOILER CORE SLAB EXPERIMENT TEST 301,
by C. Larson, P. S. Lacy, and R. Nirschl. 1 Sep 64, 29p
Contract AT (11-1)-589

Descriptors: (*Reactor system components, Nuclear power plants), (*Reactor cores, Critical assemblies).

NMI-7263 **Field 18E, 18L**
CFSTI Prices: HC$3.00 MF$0.75
Nuclear Metals, Inc., West Concord, Mass.
POWER REACTOR PROGRAM. DEVELOPMENT OF FABRICATION PROCESS FOR DRIVER TUBES FOR THE HWCTR,
by J. Siergiej, D. M. Davies, and W. J. Richmond.30 Nov 64, 66p
Contract AT (30-1)-2784

Descriptors: (*Power reactors, Pipes), (*Pipes, Nuclear power plants).

TID-21288 **Field 18E, 18M**
CFSTI Prices: HC$2.00 MF$0.50
Bureau of Mines, Morgantown, W. Va. Coal Research Center.
PROCESS HEAT REACTOR PROGRAM.
Quarterly progress rept. 1 May-31 Jul 64.
31 Jul 64, 38p

Descriptors: (*Coal, Fluidized bed processes), (*Fluidized bed processes, Environmental testing).

TID-21596 **Field 18E, 18M**
CFSTI Prices: HC$1.00 MF$0.50
Bureau of Mines, Morgantown, W. Va. Coal Research Center.
HIGH-TEMPERATURE ENERGY SYSTEMS.
Quarterly progress rept. 1 Aug-31 Oct 64.
31 Oct 64, 24p

Descriptors: (*Nuclear power plants, Gas turbines), (*Gas turbines, Heat transfer).

TID-21719 **Field 18E, 9E**
CFSTI Prices: HC$4.50 MF$2.75
General Electric Co., Cincinnatt, Ohio. Nuclear Materials and Propulst on Operation.
REMOTE HANDLING OF MOBILE NUCLEAR SYSTEMS,
by Douglas C. Layman, and Gunner Thornton. 1965, 655p
Contract AT (40-1)-2847

Descriptors: (*Remote control systems, Nuclear engineering), (*Nuclear power plants, Mobile).

AD-634 455 **See Field 18L**

ORNL-3916 **See Field 18J**

SC-DC-65-1918 **See Field 22D**

18F. RADIATION SHIELDING AND PROTECTION

AD-450 625 **Field 18F, 11B**
CFSTI Price: HC$7.60
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
HIGH-STRENGTH, HIGH-DENSITY CONCRETE,
Nov 63, 75p Technical rept. TR-6-635

Descriptors: (*Reactor shielding materials, Concrete), (*Concrete, Reactor shielding materials), (*Shielding, Radioactivity), Radiation hazards, Health physics.

Research and development on the production and use of high-density concrete as a radiation shielding material. (Author)

AGN-TM-412 **Field 18F, 18I, 18L**
CFSTI Prices: HC$4.00 MF$0.75
Aerojet-General Nucleonics, San Ramon, Calif.
ARMY GAS-COOLED REACTOR SYSTEMS PROGRAM. ML-1A SHIELD OPTIMIZATION STUDY.
Dec 65, 102p
Contract AT (10-1)-880

Descriptors: (*Gas-cooled reactors, Reactor shielding calculations), (*Reactor shielding calculations, Optimization).

LA-3383 **Field 18F, 18K**
CFSTI Prices: HC$2.00 MF$0.50
Los Alamos Scientific Lab., Univ. of California, N. Mex.
FISSION PRODUCT YIELDS FROM FAST (APPROXIMATELY EQUAL TO 1 MEV) NEUTRON FISSION OF 239 PU.
by Carl A. Anderson Jr. Jul 65, 24p
Contract W-7405-eng-36

Descriptors: (*Fission products, Fast neutrons), (*Fast neutrons, Plutonium).

ANL-7139 See Field 6R

ORNL-3041 See Field 18J

ORNL-3805 See Field 20H

ORNL-3900 See Field 7E

ORNL-3915 See Field 18D

PB-170 541 See Field 7E

18G. RADIOACTIVE WASTES

BNWL-157 **Field 18G**
CFSTI Prices: HC$4.00 MF$0.75
Battelle-Northwest, Richland, Was. Pacific Northwest Lab.
TRANSIENT THERMAL BEHAVIOR IN FIXATION OF RADIOACTIVE MATERIALS,
by G. Jansen Jr, and W. V. Demier. Jan 66, 123p
Contract AT (45-1)-1830

Descriptors: (*Radioactive waste, Confinement), (*Confinement, Heat transfer coefficients).

BNWL-187 **Field 18G**
CFSTI Prices: HC$2.00 MF$0.50
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
PURIFICATION OF RARE EARTHS FROM HANFORD WASTES BY SOLVENT EXTRACTION,
by L. A. Bray, and F. P. Roberts. Feb 66, 31p
Contract AT (45-1)-1830

Descriptors: (*Radioactive waste, Rare earths), (*Rare earths, Solvent extraction).

IDO-14672 **Field 18G**
CFSTI Prices: HC$2.00 MF$0.50
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
LEACHABILITY OF GLASS PREPARED FROM HIGHLY RADIOACTIVE CALCINED ALUMINA WASTE,
by B. E. Paige. Feb 66, 32p
Contract AT (10-1)-205

Descriptors: (*Radioactive waste, Processing), (*Wastes (Industrial), Storage).

ORNL-TM-1069 **Field 18G**
CFSTI Prices: HC$2.00 MF$0.50
Oak Ridge National Lab., Tenn.
CHEMICAL TECHNOLOGY DIVISION, UNIT OPERATIONS SECTION.
Monthly progress rept. Oct 64,
by M. E. Whatley, P. A. Haas, R. W. Horton, and C. D. Watson. May 65, 27p
Contract W-7405-eng-26

Descriptors: (*Radioactive waste, Processing), (*Aerosols, Particle size).

ORNL-3824 **Field 18G, 9B**
CFSTI Prices: HC$4.00 MF$0.75
Tennessee Valley Authority, Oak Ridge.
A COMPUTER CODE FOR STORING AND RETRIEVING DATA AND DEVELOPING IMPROVED SOLIDS FOR FIXATION OF HIGHLY RADIOACTIVE WASTES,
by C. L. Fitzgerald, H. W. Godbee, M. H. Davis, and W. E. Clark. Mar 66, 106p
Contract W-7405-eng-26

Descriptors: (*Programming (Computers), Radioactive waste), (*Radioactive waste, Programming languages).

RFP-598 **Field 18G, 17A**
CFSTI Prices: HC$2.00 MF$0.50
Rocky Flats Div., Dow Chemical Co., Golden, Colo.
RECOVERY OF PLUTONIUM FROM GRAPHITE,
by A. K. Williams, and C. J. Pinamont. 8 Nov 65, 24p
Contract AT (29-1)-1106

Descriptors: (*Plutonium, Recovery), (*Graphite, Plutonium).

Y-1531 **Field 18G, 7A, 13D**
CFSTI Prices: HC$3.00 MF$0.75
Union Carbide Corp., Oak Ridge, Tenn. Y-12 Plant.
MIXING OF FLUIDS IN SMALL-DIAMETER TANKS BY RECIRCULATION.
Master's thesis,
by J. E. Harrell. 11 Apr 66, 96p
Contract W-7405-eng-26

Descriptors: (*Fluids, Mixtures), (*Tanks (Containers), Fluids).

For abstract, see N 20 13.

AD-463 222 See Field 7E

BNWL-113-13 See Field 7E

BNWL-36 See Field 7E

IDO-14650 See Field 7A

ORNL-3868 See Field 18J

ORNL-3900 See Field 7E

ORNL-3915 See Field 18D

PB-170 541 See Field 7E

UCRL-16511 See Field 18D

18H. RADIOACTIVITY

AD-634 292 **Field 18H, 11H, 22B**
CFSTI Prices: HC$1.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
RADIATION EFFECTS IN FLUOROLUBE.
Technical rept.,
by M. J. Downey. Feb 66, 16p TR-66024

Descriptors: (*Damping, Fluids), (*Radiation damage, *Halogenated hydrocarbons), Polymers, Viscosity, Mass spectrum, Gases, Separation, Gas analysis, Gamma rays, Gyroscopes, Great Britain, Space environmental conditions, Satillites (Artificial).

Identifiers: Fluorolube.

The Report describes a preliminary programme of work undertaken in order to examine the effects of gamma radiation on Fluorolube. The changes in viscosity and the amount of gas evolved, under certain conditions, as a result of doses of 10, 40, 100, 150 and 200 megarads, are given. (Author)

AD-634 493 **Field 18H, 9A**
CFSTI Prices: HC$4.00 MF$1.00
New Mexico Univ., Albuquerque. Bureau of Engineering Research.
LABORATORY TESTING AND THEORETICAL STUDIES IN TRANSIENT RADIATION EFFECTS ON MICROELECTRONICS.
Rept. for 1 Sep 64-31 Jul 65,
by W. W. Grannemann. May 66, 150p
Contract AF 29 (601)-6637
Proj. AF-5710
AFWL-TR-65-175

Descriptors: (*Radiation damage, *Electronic equipment), Microminiaturization (Electronics), Circuits, Transistors, Integrated circuits, Computer logic, Semiconductors, Electric currents, Integral equations, Statistical functions, Semiconductor devices, Transport properties, Resistors.

Identifiers: Microelectronics.

A series of experimental studies was conducted on transistor elements suitable for microcircuits. A relationship of transient radiation effects to active volume and other parameters was made. The experimental and theoretical method developed offers a way of obtaining minority carrier lifetimes, depletion layer width, junction area, diffusion length, and active volume when the absorbed dose and the ionization efficiency are known in the transistor element of a microcircuit. Conversely, given the above parameters it is possible to determine the primary photocurrent of the microcircuit junction under a variety of radiation conditions. It was shown that the fundamental Boltzmann equation describing charge transport in semiconductors can be used to modify the usual continuity equation to obtain a more accurate circuit model for transistor elements in microcircuits. The oxide-isolated microcircuits were tested and compared with the usual backbiased isolation junction diode type.

AD-634 534 **Field 18H, 20H, 15B**
CFSTI Prices: HC$4.00 MF$1.00
General Dynamics /Fort Worth, Tex. Nuclear Aerospace Research Facility.
EXPANSION OF FALLOUT-RADIATION NUMBER-SPECTRA CALCULATIONS TO LOW ALTITUDE.
Final rept., 20 Sep 65-20 Apr 66,
by O. L. McDermed, and T. W. DeVries. 1 Jul 66, 130p FZK-291
Contract N228 (62479)69007

Descriptors: (*Radioactive fallout, *Gamma-ray spectroscopy), Gamma-ray spectra, Dose rate, Fission products, Terrain, Atmosphere, Correlation techniques, Airborne, Radiation measurement systems, Health physics, Civil defense systems.

Gamma-ray number and dose-rate spectra in the air above a smooth, quasi-infinite ground uniformly covered with fallout fission products are calculated. The spectra are calculated for 11 decay times, from 1.12 hours to 97.3 days, and at 7 altitudes, from 3 ft to 200 ft. The spectra are analyzed for the effects of altitude and decay time on spectral shape, with trends illustrated by computer tabulations and selected graphs. Results show that the spectra soften with increasing altitude and that they soften with decay time for about 2 days, become slightly harder for about 3 weeks, then resume softening. Reduction of total dose rate with altitude is nearly independent of decay time (below 400 feet). A related study, to determine the effects of ground roughness, is recommended. (Author)

DP-949 **Field 18H, 20H**
CFSTI Prices: HC$2.00 MF$0.50
Du Pont De Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
ENERGY SPECTRA OF NEUTRONS AND GAMM RAYS FROM SPONTANEOUS FISSION OF 244 CM.
by Richard T. Herold. Jul 65, 23p
Contract AT (07-2)-1

Descriptors: (*Curium, Fission), (*Neutron spectrum, Gamma rays).

For abstract, see T 66 15.

HASL-165 **Field 18H, 6R**
CFSTI Prices: HC$7.00 MF$1.75
Health and Safety Lab., New York Operations Office (AEC), N. Y.
FALLOUT PROGRAM.
Quarterly summary rept. 1 Sep-1 Dec 65,
by Edward P. Hardy Jr, and Joseph Rivera. 1 Jan 66, 390p

Descriptors: (*Radioactive fallout, Health physics), (*Radiological contamination, Radiation monitors).

IDO-12047 **Field 18H, 6R**
CFSTI Prices: HC$2.00 MF$0.50
Idaho Operations Office (AEC), Idaho Falls. Health and Safety Div.
CONTROLLED ENVIRONMENTAL RADIOIODINE TESTS AT THE NATIONAL REACTOR TESTING STATION, 1965 PROGRESS REPORT,
by D. R. Adams, D. F. Bunch, W. P. Gammill, C. A. Hawley Jr, and M. W. Tiernan. Feb 66, 47p

Descriptors: (*Radioactive isotopes, Iodine), (*Environmental tests, Radioactive fallout).

LA-1981 **Field 18H, 6R, 18C**
CFSTI Prices: HC$2.00 MF$0.50
Los Alamos Scientific Lab., Univ. of California, N. Mex.
PLUTONIUM DISPERSAL BY ACCIDENTAL OR EXPERIMENTAL LOW-ORDER DETONATION OF ATOMIC WEAPONS,
by W. H. Langham, P. S. Harris, and T. L. Shipman. Dec 65, 40p
Contract W-7405-ENG-36

Descriptors: (*Reactor hazards, Plntonium), (*Nuclear weapons, Detonations).

LA-3366 **Field 18H**
CFSTI Prices: HC$3.00 MF$0.50
Los Alamos Scientific Lab., Univ. of California, N. Mex.
CRITICALITY CONTROL IN OPERATIONS WITH FISSILE MATERIAL,
by H. C. Paxton. Dec 64, 48p
Contract W-7405-ENG-36

Descriptors: (*Reactor operation, Reactor safety systems), (*Reactor control, Radioactivity).

LA-3374 **Field 18H**
CFSTI Prices: HC$2.00 MF$0.50
Los Alamos Scientific Lab., Univ. of California, N. Mex.
HYDRO -- A SMALL, WATER-COOLED, AND WATER-REFLECTED NEUTRON SOURCE,
by William Bernard. Dec 65, 29p
Contract W-7405-eng-36

Descriptors: (*Critical assemblies, Reactor system components), (*Reactor lattice parameters, Reactor operation).

Identifiers: Hydro machine.

LA-3432 **Field 18H, 6R**
CFSTI Prices: HC$6.00 MF$1.50
Los Alamos Scientific Lab., Univ. of California, N. Mex.
BIOLOGICAL AND MEDICAL RESEARCH GROUP (H-4) OF THE HEALTH DIVISION.
Annual rept., Jul 64 through Jun 65.
Jul 65, 267p
Contract W-7405-eng-36

Descriptors: (*Radiobiology, Medical research), (*Radiation effects, Health physics).

NBS-TN-283 **Field 18H, 14B, 20H, 20G**
CFSTI Prices: HC$0.35 MF$0.50
National Bureau of Standards, Washington, D. C.
NUCLEAR AND RADIATION STANDARDS OF IMPORTANCE TO THE NATIONAL ATOMIC ENERGY PROGRAM,
by H. W. Koch, H. J. Donnert, W. W. Havens Jr, G. L. Rogosa, and L. Rosen. 31 Mar 66, 47p
Hard copy available from Superintendent of Documents, GPO, Washington, D. C. 20402, $0.35.

Descriptors: (*Nuclear physics, Standards), (*Standards, Nuclear physics), Nuclear cross sections, Particle accelerator targets, Radiation measurement systems, Experimental data.

A systematic approach to physical measurements in nuclear physics requires the establishment, availability, and use of standards. The standards of measurement may consist of standard cross sections, foils, counters, and evaluated nuclear data. Because of the fundamental importance of measurement standards, the Nuclear Cross Section Advisory Group has examined the definitions, requirements, characteristics, and availability of nuclear and radiation standards of importance to the national atomic energy program. The report presents the results of the examination and a statement of future needs. (Author)

ORNL-IIC-8
CFSTI Prices: HC$3.00

ORNL-IIC-8 **Field 18H**
CFSTI Prices: HC$3.00 MF$0.75
Oak Ridge National Lab., Tenn.
REACTOR YIELD CALCULATIONS FOR 81 RADIOISOTOPES PRODUCED BY (N,GAMMA) REACTIONS AT FLUXES OF 10 7 TO 10 16 N/CM 2SEC FOR IRRADIATION TIMES OF 30 MINUTES TO ONE YEAR,
by T. C. Whitson, and C. W. Friend. Apr 66, 87p
Contract W-7405-eng-26

Descriptors: (*Radioactive isotopes, Nuclear reactions), (*Decay schemes, Radioactive isotopes).

For abstract, see N 20 12.

UCRL-14702 **Field 18H, 6R, 12A**
CFSTI Prices: HC$1.00 MF$0.50
Lawrence Radiation Lab., Univ. of California, Livermore.
DEPOSITION VELOCITIES OF AEROSOLS AND VAPORS ON PASTURE GRASS,
by H. Leonard Fisher. 14 Mar 66, 20p
Contract W-7405-eng-48

Descriptors: (*Aerosols, Velocity), (*Radioactive fallout, Mathematical prediction).

For abstract, see N 20 13.

WCAP-3385-5 **Field 18H, 11F, 18I, 18J K**
CFSTI Prices: HC$4.00 MF$0.75
Westinghouse Electric Corp., Pittsburgh, Pa. Atomic Power Div.
SAXTON PLUTONIUM PROGRAM.
Quarterly progress rept. no. 5, 30 Sep 65. . Oct 65, 104p EURAEC-1465
Contract AT (30-1)3335

Descriptors: (*Plutonium, Reactor fuels), (*Reactor fuels, Pressurized water reactors).

BNWL-113-12 **See Field 7E**

BNWL-113-13 **See Field 7E**

BNWL-36 **See Field 7E**

HASL-168 **See Field 7E**

HASL-169 **See Field 7E**

IDO-17103 **See Field 9A**

LA-3397 **See Field 6R**

PB-170 541 **See Field 7E**

UCRL-14534 **See Field 6R**

18I. REACTOR ENGINEERING AND OPERATION

AD-634 590 **Field 18I, 18L**
CFSTI Prices: HC$1.00 MF$0.50
Department of the Navy, Washington, D. C.
CONFERENCE ON THE ANNIVERSARY OF THE FIRST ATOMIC ELECTRIC POWER STATION (AES), (10th),
by Yu. K. 1966, 6p Translation-2162 Konferentsiya, Posvyashchennaya 10-Letiyu Pervoi Atomnoi Elektrostantsii, Trans. of Atomnaya Energiya (USSR) v17 n3 p227-9 1964.

Descriptors: (*Nuclear reactors, USSR), (*Symposia, *Nuclear engineering), Power reactors, Reactor coolants, Reactor cores, Reactor fuels, Electric power production, Liquid metal cooled reactors, Marine nuclear propulsion, Research reactors.

For abstract, see T 66 15.

AMF-338-TR-4 **Field 18I**
CFSTI Prices: HC$6.00 MF$1.50
AMF Atomics, York, Pa.
AMF ON-POWER REFUELING SYSTEM FOR A AONDU-TYPE REACTOR. PROTOTYPE REFUELING HEAD.
Final development rept.
Dec 64, 239p
Contract AT (38-1)-233

Descriptors: (*Refueling, Hydraulic systems), (*Nuclear reactors, Refueling).

ANL-6981 **Field 18I, 18J**
CFSTI Prices: HC$2.00 MF$0.50
Argonne National Lab., Idaho Falls, Idaho. Argonne National Lab., Ill.
TUNGSTEN-RHENIUM ALLOY THERMOCOUPLES AND THEIR USE IN A U02-FUELED REACTOR,
by E. J. Brooks, and W. C. Kramer. Nov 65, 45p
Contract W-31-109-ENG-38
Prepared in cooperation with Argonne National Lab., Idaho Falls, Idaho. Argonne National Lab., Ill.

Descriptors: (*Thermocouples, Reactor materials), (*Reactor fuel rods, Reactor (Cores)).

BNL-887 **Field 18I, 18J, 18K, 18L**
CFSTI Prices: HC$3.00 MF$0.50
Brookhaven National Lab., Upton, N. Y.
THE RANDOMLY PACKED SETTLED-BED FAST REACTOR CONCEPT (1000-MW (E) REACTOR DESIGN),
by L. Green, and M. M. Lovine. 1 Jun 65, 56p
Contract AT (20-2)-GEN-16

Descriptors: (*Fast reactors, Nuclear engineering), (*Reactor materials, Economics).

BNWL-189 **Field 18I, 18J, 9B**
CFSTI Prices: HC$4.00 MF$0.75
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
UCOST - A COMPUTER CODE FOR CALCULATING THE COST OF ENRICHED URANIUM,
by D. E. Deonigi, E. A. Eschbach, and M. F. Kanninen.Feb 66, 113p
Contract AT (45-1)-1830

Descriptors: (*Reactor fuels enrichments, Costs), (*Programming (Computers), Reactor fuel enrichment).

Identifiers: Ucost.

BNWL-206 **Field 18I, 21B**
CFSTI Prices: HC$3.00 MF$0.50
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
EXPERIMENTAL BOILING BURNOUT HEAT FLUXES WITH AN ELECTRICALLY HEATED 19-ROD BUNDLE TEST SECTION,
by G. M. Hesson, D. E. Fitzsimmons, and J. M. Batch. Dec 65, 47p
Contract AT (45-1)-1830

Descriptors: (*Reactor fuel elements, Burnthrough), (*Burnthrough, Reactor coolants).

CEND/PRWRA-257 **Field 18I, 18L**
CFSTI Prices: HC$9.00 MF$2.50
Combusion Engineering, Inc., Windsor, Conn. Puerto Rico Water Resources Authority, San Juan.

BOILING NUCLEAR SUPERHEATER (BONUS) POWER STATION.
Startup summary rept. Feb 66.
Feb 66, 600p
Contract AT (40-1)-2672

Descriptors: (*Nuclear power plants, Reactor start-up sources), (*Reactor systems components, Power reactors).

CEND/PRWRA-257A **Field 18I, 18L**
CFSTI Prices: HC$2.00 MF$0.50
Combustion Engineering, Inc., Windsor, Conn.
BOILING NUCLEAR SUPERHEATER BONUS POWER STATION ABSTRACT OF STARTUP SUMMARY REPORT (CEND/PRWRA-257).
Mar 66, 45p
Contract AT (40-1)-2674
Prepared in cooperation with Puerto Rico Water Resources Authority, San Juan, Contract AT (40-1)-2672.

Descriptors: (*Nuclear power plants, Reactor startup sources), (*Puerto Rico, Nuclear power plants).

CONF-650217 **Field 18I, 18J**
CFSTI Prices: HC$1.75 MF$1.00
Division of Reactor Development and Technology (AEC), Washington, D. C.
PULSED HIGH INTENSITY FISSION NEUTRON SOURCES,
by G. A. Kolstad, and I. F. Zartman. 1965, 152p
Proceedings of a symposium, USAEC, Washington, D. C., February 1965.

Descriptors: (*Fission neutrons, Neutron flux), (*Neutron flux, Research reactors).

IDO-17127 **Field 18I, 9B**
CFSTI Prices: HC$3.00 MF$0.75
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
XKINEQ--A TWO-GROUP, TWO-DIMENSIONAL, MULTIREGION COMPUTER CODE FOR EXAMINING FLUX STABILITY IN NUCLEAR REACTORS IN THE PRESENCE OF 135 XE.
by Gary M. Sandquist. Jan 66, 98p
Contract AT (10-1)-205

Descriptors: (*Neutron flux, Nuclear reactors), (*Programming (Computers), Neutron flux).

Identifiers: XKINEQ.

IDO-17135 **Field 18I, 18M**
CFSTI Prices: HC$3.00 MF$0.75
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
IN-TANK IRRADIATION FACILITIES AT THE TEST REACTOR AREA (STANDARD PRACTICES GUIDE),
by R. L. Ackaret, and A. S. Richardson. Jan 66, 81p
Contract AT (10-1)-205

Descriptors: (*Test reactors, Reactor materials), (*Reactor operation, Reactor system components).

IDO-17146 **Field 18I, 18J**
CFSTI Prices: HC$2.00 MF$0.50
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
SPERT PROJECT.
Quarterly technical rept. Jul-Sep 65,
by J. G. Crocker. Feb 66, 39p
Contract AT (10-1)-205

Descriptors: (*Reactor lattice parameters, Reactor operation), (*Reactor system components, Reactor materials).

IDO-17158 **Field 18I, 18M**
CFSTI Prices: HC$3.00 MF$0.50
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
CRACK IN THE ENGINEERING TEST REACTOR PRIMARY COOLING SYSTEM,
by E. H. Smith, J. L. Liebenthal, and H. D. Killian. Mar 66, 50p
Contract AT (10-1)-205

Descriptors: (*Test reactors, Leakage (Fluid)), (*Reactor accidents, Leakage (Fluid)).

For abstract, see N 20 13.

IDO-17161 **Field 18I**
CFSTI Prices: HC$2.00 MF$0.50
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
GAMMA ENERGY RELEASE FROM FISSION PRODUCT DECAY FOLLOWING A SHORT REACTOR TRANSIENT,
by J. K. Warkentin. Apr 66, 32p
Contract AT (10-1)-205

Descriptors: (*Gamma emission, Fission product activity), (*Fission product activity, Gamma emission).

For abstract, see N 20 13.

IDO-28595 **Field 18I**
CFSTI Prices: HC$2.00 MF$0.75
Aerojet-General Nucleonics, San Ramon, Calif.
ARMY GAS-COOLED REACTOR SYSTEMS PROGRAM. HECTIC-II. AN IBM 7090 FORTRAN COMPUTER PROGRAM FOR HEAT TRANSFER ANALYSIS OF GAS OR LIQUID COOLED REACTOR PASSAGES,
by N. Kattchee, and W. C. Reynolds. Dec 62, 80p
Contract AT (10-1)-880

Descriptors: (*Gas-cooled reactors, Heat transfer), (*Heat transfer, Programming (Computers)).

Identifiers: Hectic II.

IITRI-578P22-14 **Field 18I, 18J**
CFSTI Prices: HC$7.00 MF$1.50
IIT Research Inst., Chicago, Ill.
STUDIES OF REACTOR CONTAINMENT STRUCTURES.
Summary rept. 1 Feb 63-30 Jun 64,
by M. A. Salmon, R. L. Chiapetta, and F. L. Schulyer. 1964, 334p
Contract AT (11-1)-578
Proj. M262

Descriptors: (*Containment, Nuclear reactors), (*Reactor safety systems, Reactor materials).

LA-3418 **Field 18I, 20D**
CFSTI Prices: HC$3.00 MF$0.75
Los Alamos Scientific Lab., Univ. of California, N. Mex.
LONGITUDINAL LAMINAR FLOW OF AN INCOMPRESSIBLE FLUID IN FINITE TUBE BUNDLES WITH M ; 1 TUBES,
by Roy A. Axford. 11 Sep 65, 85p
Contract W-7405-eng-36

Descriptors: (*Reactor fuel elements, Heat transfer), (*Laminar flow, Velocity).

LA-3482 **Field 18I, 18J**
CFSTI Prices: HC$3.00 MF$0.75
Los Alamos Scientific Lab., Univ. of California, N. Mex.
QUARTERLY STATUS REPORT ON ADVANCED REACTOR TECHNOLOGY (ART) FOR PERIOD ENDING JANUARY 31, 1966.
Feb 66, 64p
Contract W-7405-eng-36

Descriptors: (*Reactor fuels, Plutonium), (*Liquid metals, Reactor fuels).

NAA-SR-11193 **Field 18I, 14B, 18J**
CFSTI Prices: HC$2.00 MF$0.50
Atomics International, Canoga Park, Calif.
DEVELOPMENT OF NOISE AND ANALYSIS TECHNIQUES FOR MEASURING REACTOR COOLANT VELOCITIES,
by R. L. Randall, P. J. Pekrul, and G. R. Grayban. 25 Mar 66, 32p
Contract AT-11-2-GEN-8

Descriptors: (*Reactor coolants, Velocities), (*Reactor cores, Reactor materials).

NAA-SR-11628 **Field 18I, 18J, 18L**
CFSTI Prices: HC$4.00 MF$1.00
Atomics International, Canoga Park, Calif.
PIQUA NUCLEAR POWER FACILITY REACTOR OPERATIONS, ANAYLIS PROGRAM.
Semiannual progress rept. no. 6, 1 Jan-30 Jun 65,
by H. Caialdu, W. S. Debear, T. Y. Fukushima, and R. M. Mills. 15 Dec 65, 134p
Contract AT-11-1-GEN-8

Descriptors: (*Power reactors, Reactor operation), (*Reactor system components, Reactor coolants).

NYO-10295 **Field 18I, 18J**
CFSTI Prices: HC$2.00 MF$0.50
Columbia Univ., New York.
I. FURTHER INVESTIGATIONS ON THE STABILIZATION OF AQUEOUS SUSPENSIONS OF THORIUM OXIDE. II. AN ULTRA-HIGH RADIOFREQUENCY SPECTROMETER FOR THE STUDY OF AQUEOUS SOLUTIONS AND SUSPENSIONS.
Progress rept. for 1 Mar 60-31 Aug 62,
by Robert H. Smellie Jr. 15 Oct 62, 34p
Contract AT (30-1)-2267

Descriptors: (*Thorium compounds, Oxides), (*Nuclear reactors, Reactor materials).

ORNL-3932 **Field 18I**
CFSTI Prices: HC$2.00 MF$0.50
Oak Ridge National Lab., Tenn.
THE MANUFACTURE OF THE CONTROL RODS FOR THE EXPERIMENTAL GAS-COOLED REACTOR,
by G. M. Tolson. Apr 66, 23p
Contract W-7405-eng-26

Descriptors: (*Gas-cooled reactors, Control rods), (*Control rods, Manufacturing methods).

For abstract, see N 20 12.

RL-SEP-414 **Field 18I, 18J, 7A**
CFSTI Prices: HC$1.00 MF$0.50
General Electric Co., Cincinnati, Ohio. Nuclear Materials and Propulsi on Operation.
STIRRED-bED GAS-SOLIDS REACTOR FOR PREPARING PLUTONIUM TRICHLORIDE,
by I. S. Soine. Aug 65, 13p
Contract AT (45-1)-1350

Descriptors: (*Plutonium compounds, Chlorides), (*Production reactors, Plutonium).

TID-22330 **Field 18I, 18L, 7A**
CFSTI Prices: HC$1.25 MF$1.25
Bechtel Corp., San Francisco, Calif.
ENGINEERING AND ECONOMIC FEASIBILITY STUDY FOR A COMBINATION NUCLEAR POWER AND DESALTING PLANT. SUMMARY.
Dec 65, 199p

Descriptors: (*Water supplies, Desalination), (*Nuclear power plants, Distilling plants).

WAPD-MRP-114 **Field 18I, 18J, 18K, 18L K**
CFSTI Prices: HC$2.50 MF$0.75
Bettis Atomic Power Lab., Pittsburgh, Pa.
PRESSURIZED WATER REACTOR (PWR) PROJECT.
Technical progress rept. Jul 24-Oct 21 65.
21 Oct 65, 104p
Contract AT (11-1)-GEN-14

Descriptors: (*Pressurized water reactors, Nuclear engineering), (*Reactor materials, Pressurized water reactors).

WAPD-MRP-115 **Field 18I, 18J, 18K, 18L**
CFSTI Prices: HC$4.00 MF$0.75
Bettis Atomic Power Lab., Pittsburgh, Pa.
PRESSURIZED WATER REACTOR (PWR) PROJECT.
Technical progress rept., 22 Oct 65 - 21 Jan 66, 21 Jan 66, 105p
Contract AT (11-1)-GEN-14

Descriptors: (*Pressurized water reactors, Reactor system components), (*Reactor materials, Pressurized water reactors).

WAPD-TM-483 **Field 18I, 18J**
CFSTI Prices: HC$3.00 MF$0.75
Bettis Atomic Power Lab., Pittsburg, Pa.
SUMMARY DESIGN REPORT FOR MELBA TEST IN PWR CORE 2 BLANKET,
by R. L. Henke. Mar 66, 68p
Contract AT-11-1-GEN-14

Descriptors: (*Reactor system components, Reactor materials), (*Reactor cores, Fuel burn up).

Identifiers: Melba.

WCAP-6073 **Field 18I, 9B, 12A**
CFSTI Prices: HC$4.00 MF$0.75
Westinghouse Electric Corp., Pittsburgh, Pa. Atomic Power Div.
LASER, A DEPLETION PROGRAM FOR LATTICE CALCULATIONS BASED ON MUFT AND THERMOS,
by C. G. Poncelet. Apr 66, 104p
Contract AT (30-1)-3017

Descriptors: (*Reactor lattice parameters, Algebra), (*Fuel burn up, Reactor system components).

Identifiers: Laser, Muft, Thermos.

For abstract, see N 20 13.

WCAP-6079 **Field 18I, 18J, 18L**
CFSTI Prices: HC$3.00 MF$0.75
Westinghouse Electric Corp., Pittsburg, Pa. Atomic Power Div.
YANKEE CORE EVALUATION PROGRAM.
Quarterly progress rept. 31 Dec 65,
by M. J. O'Boyle. Jan 66, 80p
Contract AT (30-1)-3017

Descriptors: (*Reactor cores, Fuel burn up), (*Reactor system components, Reactor lattice parameters).

AD-419 846 **See Field 20C**

AD-634 455 **See Field 18L**

AGN-TM-412 **See Field 18F**

ANL-7152 **See Field 18D**

ANL-7176 **See Field 11B**

BMI-1754 **See Field 18J**

BNWL-113-12 **See Field 7E**

BNWL-113-13 **See Field 7E**

BNWL-234 **See Field 9B**

DP-834 **See Field 18D**

LA-3427 **See Field 9B**

NAA-SR-11739 **See Field 13H**

ORNL-3900 **See Field 7E**

ORNL-3913 **See Field 7E**

ORNL-3916 **See Field 18J**

ORNL-3918 **See Field 13I**

PB-170 558 **See Field 18J**

STL-372-14 (1) **See Field 20D**

WCAP-3385-5 **See Field 18H**

WCAP-3385-6 **See Field 18J**

18J. REACTOR MATERIALS

ANL-7077 **Field 18J, 7A, 13H**
CFSTI Prices: HC$2.00 MF$0.50
Argonne National Lab., Ill.
LABORATORY INVESTIGATIONS IN SUPPORT OF FLUID-BED FLUORIDE VOLATILITY PROCESSES. PART IX. THE FLUID-BED FLUORINATION OF PLUTONIUM-CONTAINING SIMULATED OXIDIC NUCLEAR FUEL IN A 1 1/2-INCH-DIAMETER REACTOR,
by R. L. Jarry, A. V. Hariharan, J. Fischer, M. J. Steindler, and T. D. Baker. Dec 65, 48p
Contract W-31-109-eng-38

Descriptors: (*Fluidized bed processes, Reactor fuels), (*Plutonium, Fluorination).

ANL-7094 **Field 18J, 11F**
CFSTI Prices: HC$2.00 MF$0.50
Argonne National Lab., Ill.
REVIEW OF STATUS OF SELF-DIFFUSION IN US, UN, U02, AND UC,
by C. M. Walter. Nov 65, 25p
Contract W-31-109-eng-38

Descriptors: (*Reactor materials, Uranium compounds), (*Uranium compounds, Diffusion).

BDX-613-11 **Field 18J, 11I**
CFSTI Prices: HC$1.00 MF$0.50
Bendix Corp., Kansas City, Mo.
EFFECTS OF TEMPERATURE ON FILLED EPOXY ENCAPSULATION MATERIALS,
by B. A. Davis. 14 Oct 60, 9p
Contract AT (29-1)-613

Descriptors: (*Reactor materials, Encapsulation), (*Plastics, Molding).

BMI-1754 **Field 18J, 18I, 11F**
CFSTI Prices: HC$2.00 MF$0.50
Battelle Memorial Inst., Columbus, Ohio.
PROGRESS RELATING TO CIVILIAN APPLICATIONS DURING DECEMBER 1965,
by Russell W. Dayton, and Stan J. Paprocki. 1 Jan 66, 25p
Contract W-7405-eng-92

Descriptors: (*Reactor materials, Metallography), (*Reactor fuels, Gas-cooled reactors).

BNWL-201 **Field 18J**
CFSTI Prices: HC$1.00 MF$0.50
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
RADIATION-INDUCED DIMENSIONAL CHANGES OF GRAPHITES CONTAINING CARBON BLACK,
by J. W. Helm. Mar 66, 13p
Contract AT (45-1)-1830

Descriptors: (*Graphite, Carbon black), (*Radiation damage, Graphite).

DP-994 **Field 18J**
CFSTI Prices: HC$1.00 MF$0.50
Du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
IRRADIATION BEHAVIOR OF Zr-U DRIVER TUBES FOR HWCTR,
by Carl L. Angerman, and George R. Caskey Jr. Oct 65, 18p
Contract AT (07-2)-1

Descriptors: (*Reactor system components, Reactor materials), (*Nuclear reactors, Pipes).

EURAEC-1112 **Field 18J**
CFSTI Prices: HC$1.00 MF$0.50
Battelle Institut E. V., Frankfurt AM Main (West Germany).
RESEARCH TO DETERMINE THE LONG-TERM MECHANICAL PROPERTIES OF METALS SUBJECTED TO MECHANICAL STRESS AT ELEVATED TEMPERATURES AND NEUTRON IRRADIATION.
Quarterly rept. no. 6,
by W. Siegfried, and S. Zimering. 1964, 18p
Contract 100-62-12 RDS

Descriptors: (*Metals, Mechanical properties), (*Reactor materials, Stresses).

GEMP-55A **Field 18J, 11B, 11F**
CFSTI Prices: HC$3.00 MF$0.75
General Electric Co., Cincinnati, Ohio. Nuclear Materials and Propulsi on Operation.
HIGH-TEMPERATURE MATERIALS PROGRAM.
Progress rept. no. 55, pt. A.
21 Jan 66, 80p
Contract AT (40-1)-2847

Descriptors: (*Refractory metal alloys, Reactor materials), (*Reactor materials, High-temperature research).

IDO-17154 **Field 18J**
CFSTI Prices: HC$4.00 MF$1.00
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
ANNUAL PROGRESS REPORT ON REACTOR FUELS AND MATERIALS DEVELOPMENT FOR FY 1965,
by W. C. Francis. Feb 66, 138p
Contract AT (10-1)-205

Descriptors: (*Reactor fuels, Ceramic materials), (*Reactor materials, Metallurgy).

IS-1269 **Field 18J, 11F**
CFSTI Prices: HC$2.00 MF$0.50
Ames Lab., Iowa State Univ. of Science and Tech.
THE BISMUTH-ZIRCONIUM ALLOY SYSTEM,
by C. B. Hamilton, and H. A. Wilhelm. Apr 64, 24p
Contract W-7405-ENG-82

Descriptors: (*Reactor materials, Bismuth alloys), (*Zirconium alloys, Reactor materials).

KY-L258 (Rev-1) **Field 18J, 18K**
CFSTI Prices: HC$1.00 MF$0.50
Paducah Gaseous Diffusion Plant, Ky.
THE DENSITY EFFECT--IN REGARDS TO THE MINIMUM CRITICAL ENRICHMENT OF AQUEOUS HOMOGENEOUS SOLUTIONS,
by O. W. Hermann. 16 Jan 62, 6p
Contract W-7405-eng-26

Descriptors: (*Reactor fuel enrichment, Density), (*Reactor lattice parameters, Reactor fuels).

LA-3388 **Field 18J**
CFSTI Prices: HC$1.00 MF$0.50
Los Alamos Scientific Lab., Univ. of California, N. Mex.
PIN TECHNIQUE FOR DISPLACEMENT MEASUREMENTS IN KIWI TNT.
by Beverly Washburn, and C. E. Hudson. 8 Jun 65, 19p
Contract W-7405-eng-36

Descriptors: (*Reactor fuel elements, Reactor cores), (*Reactor system components, Reactor materials).

Identifiers: Pin technique.

LA-3468 **Field 18J, 7A**
CFSTI Prices: HC$2.00 MF$0.50
Los Alamos Scientific Lab., Univ. of California, N. Mex.
SEPARATION AND SPECTROPHOTOMETRIC MEASUREMENT OF 0.5 TO 10 PARTS PER MILLION OF THORIUM IN PLUTONIUM,
by R. G. Bryan, and G. R. Waterbury. 1 Feb 66, 19p
Contract W-7405-eng-36

Descriptors: (*Thorium, Separation), (*Plutonium, Spectrophotometers).

For abstract, see N 20 13.

MCW-1493 **Field 18J**
CFSTI Prices: HC$2.00 MF$0.50
Mallinckrodt Chemical Works, Weldon Spring, Mo. Uranium Div.
PROCESS DEVELOPMENT QUARTERLY PROGRESS REPORT, JULY-SEPTEMBER 1965.
1 Nov 65, 27p
Contract W-14-108-eng-8

Descriptors: (*Reactor fuel elements, Chemical analysis), (*Thorium compounds, Reactor fuel elements).

NAA-SR-11140 **Field 18J**
CFSTI Prices: HC$3.00 MF$0.50
Atomics International, Canoga Park, Calif.
IRRADIATION BEHAVIOR OF URANIUM MONOCARBIDE FUEL EXPERIMENTS NAA 81-3 AND AL 3-12,
by J. L. Arnold. 25 Mar 66, 53p
Contract AT (11-1)-GEN-8

Descriptors: (*Uranium compounds, Reactor fuels), (*Reactor fuels, Uranium compounds).

For abstract, see N 20 13.

NLCO-970 **Field 18J**
CFSTI Prices: HC$3.00 MF$0.75
National Lead Co. of Ohio. Cincinnati.
SUMMARY TECHNICAL REPORT FOR THE PERIOD OCTOBER 1-DECEMBER 31, 1965,
by R. Burgett. Feb 66, 61p
Contract AT (30-1)-1156

Descriptors: (*Reactor fuel elements, Uranium), (*Reactor materials, Thorium).

N66-14579 **Field 18J**
CFSTI Prices: HC$3.00 MF$0.50
United Aircraft Corp., East Hartford, Conn. Research Labs.
THEORETICAL INVESTIGATION OF THE OPACITY OF HEAVY-ATOM GASES,
by N. L. Krascella. Sep 65, 60p D-910092-4
Contract NASw-847
NASA-CR-69001

Descriptors: *Nuclear fuel, *Tungsten, *Absorption spectrum, *Opacity.

N66-14582 **Field 18J**
CFSTI Prices: HC$3.00 MF$0.75
United Aircraft Corp., East Hartford, Conn. Research Labs.
THEORETICAL INVESTIGATION OF THE LOWEST FIVE IONIZATION POTENTIALS OF URANIUM,
by H. H. Michels, S. B. Schneiderman, and H. A. Williamson. Sep 65, 67p D-910099-2
Contract NASw-847
NASA-CR-69002

Descriptors: *Ionization potential, *Uranium, *Quantum mechanics.

ORNL-TM-1150 **Field 18J**
CFSTI Prices: HC$2.00 MF$0.50
Oak Ridge National Lab., Tenn.
EXAMINATION OF IRRADIATED U02 PARTICLES FROM AEROJET GENERAL NUCLEONICS,
by N. A. Krohn, and R. L. Pearson. Jul 65, 30p
Contract W-7405-eng-26

Descriptors: (*Radioactive isotopes, Uranium compounds), (*Uranium compounds, Oxides).

ORNL-3041 **Field 18J, 18F**
CFSTI Prices: HC$3.00 MF$0.75
Oak Ridge National Lab., Tenn.
SDC-A SHIELDING-DESIGN CALCULATION CODE FOR FUEL-HANDLING FACILITIES,
by E. D. Arnold, and B. F. Maskewitz. Mar 66, 73p
Contract W-7405-eng-26

Descriptors: (*Reactor fuels, Handling), (*Reactor shielding calculations, Programming (Computers)).

For abstract, see N 20 12.

ORNL-3868 **Field 18J, 18G, 7A**
CFSTI Prices: HC$4.00 MF$0.75
Oak Ridge National Lab., Tenn.
UNIT OPERATIONS SECTION QUARTERLY PROGRESS REPORT, APRIL-JUNE 1965,
by M. E. Whatley, P. A. Haas, R. W. Horton, A. D. Ryon, and C. D. Watson. Dec 65, 105p
Contract W-7405-eng-26

Descriptors: (*Reactor fuel processing, Chemical engineering), (*Reactor materials, Reactor fuel processing).

ORNL-3874 **Field 18J**
CFSTI Prices: HC$3.00 MF$0.75
Oak Ridge National Lab., Tenn.
PREPARATION OF UO2 MICROSPHERES BY A SOL-GEL TECHNIQUE,
by J. P. McBride. Feb 66, 57p
Contract W-7405-eng-26

Descriptors: (*Reactor fuel enrichment, Fluidized bed processes), (*Uranium compounds, Dioxides).

ORNL-3916 **Field 18J, 18I, 18E**
CFSTI Prices: HC$3.00 MF$0.75
Oak Ridge National Lab., Tenn.
UNIT OPERATIONS SECTION QUARTERLY PROGRESS REPORT, JULY-SEPTEMBER 1965,
by M. E. Whatley, P. A. Haas, R. W. Horton, and C. D. Watson. Mar 66, 78p
Contract W-7405-eng-26

Descriptors: (*Reactor fuels, Nuclear power plants), (*Power reactors, Reactor fuels).

For abstract, see N 20 12.

ORNL-3923 **Field 18J**
CFSTI Prices: HC$2.00 MF$0.50
Oak Ridge National Lab., Tenn.
EVALUATION AND IRRADIATION EFFECTS STUDIES ON PYROLYTIC-CARBON-COATED FUEL PARTICLES,
by J. G. Morgan, P. E. Reagan, and E. L. Long Jr. Mar 66, 39p
Contract W-7405-eng-26

Descriptors: (*Reactor fuels, Fuel burn up), (*Reactor materials, Coatings).

PB-170 558 **Field 18J, 18I**
CFSTI Prices: HC$2.60 MF$0.50
Commissariat a l'Energie Atomique, Chusclan (France). Centre de Production de Plutonium de Marcoule.
REACTEURS G 2/G-3 - PUISSANCE RESIDUELLE DES ELEMENTS COMBUSTIBLES (Reactors G 2/G 3-Residual Power of the Fuel Elements),
by Hubert Fenart. Apr 66, 28p CEA-R-3004
Text in French; Attached summary in English.

Descriptors: (*Reactor fuel elements, Power), Temperature, Reactor operation, France.

An account of tests is given that were carried out on active fuel elements, either in air, or in groups of four placed in a discharge container. A comparison with the theoretical results is also made in the case of different irradiation and decay times. Information is obtained concerning: the residual power of the fuel elements; the can temperature which may be attained by these elements after extraction from the reactor; and the risk of ignition of the elements during normal discharging operations. (Author)

RFP-491 **Field 18J**
CFSTI Prices: HC$1.00 MF$0.50
Rocky Flats Div., Dow Chemical Co., Golden, Colo.
THE OXIDATION AND IGNITION OF PLUTONIUM,
by M. A. Thompson. 21 Mar 66, 17p
Contract AT (29-1)-1106

Descriptors: (*Plutonium, Ignition), (*Oxidation, Plutonium).

For abstract, see N 20 12.

RFP-691 **Field 18J, 20D**
CFSTI Prices: HC$2.00 MF$0.50
Rocky Flats Div., Dow Chemical Co., Golden, Colo.
LIQUID MEDIA FOR DENSITY MEASUREMENTS OF BERYLLIUM, PLUTONIUM, AND URANIUM,
by H. N. Elsheimer. 25 Feb 66, 25p
Contract AT (29-1)-1106

Descriptors: (*Reactor materials, Density), (*Density, Hydrostatics).

RL-SEP-824 **Field 18J**
CFSTI Prices: HC$2.00 MF$0.50
Hanford Atomic Products Operation, Richland.
CERAMIC CELLS AND ACCESSORIES FOR ELECTROWINNING AND ELECTROREFINING OF PLUTONIUM METAL,
by R. S. Rosenfels. 17 Dec 65, 33p
Contract AT (45-1)-1350

Descriptors: (*Plutonium, Electrolytic cells), (*Electrolytic cells, Ceramic materials).

For abstract, see N 20 12.

RMI-4 **Field 18J, 11F, 13H**
CFSTI Prices: HC$3.00 MF$0.75
Reactive Metals, Inc., Ashtabula, Ohio. Extrusion Plant.
QUARTERLY PROGRESS SUMMARY, OCTOBER-DECEMBER 1964.
18 Mar 66, 86p
Contract AT (30-1)-1405

Descriptors: (*Reactor fuels, Uranium), (*Reactor materials, Extrusion).

For abstract, see N 20 13.

TID-11295 (Pt. 1, 4th ed.) **Field 18J**
CFSTI Prices: HC$5.00 MF$1.00
Division of Reactor Development and Technology (AEC), Washington, D. C.
NUCLEAR FUELS AND MATERIALS DEVEOPMENT,
by William L. R. Rice. Jun 65, 146p

Descriptors: (*Reactor fuels, Nuclear physics laboratories), (*Reactor materials, Nuclear physics laboratories).

TID-21673 **Field 18J, 11B**
CFSTI Prices: HC$4.00 MF$1.00
Pennsylvania State Univ., University Park. Materials Research Lab.
FUNDAMENTAL STUDIES IN HIGH-TEMPERATURE MATERIALS PHENOMENA. SCOPE I. HIGH-TEMPERATURE-PRESSURE PHYSICAL PROPERTY MEASUREMENTS. SCOPE II. ELECTRICAL RESISTIVITY MEASUREMENTS OF MATERIALS IN RELATION TO HIGH TEMPERATURE TRANSFORMATIONS. SCOPE III. TRANSFORMATIONS IN AB2 INTERMETAL.
by M. E. Bell, Rustum Roy, W. R. Buessem, L. N. Mulay, and L. E. Cross. 1964, 123p
Contract AT (30-1)-2581

Descriptors: (*Ceramic materials, High-temperature research), (*Heat-resistant materials, Phase studies).

TID-6506 (Pt. 2, 3rd ed.) **Field 18J**
CFSTI Prices: HC$3.00 MF$0.75
Division of Reactor Development and Technology (AEC), Washington, D. C.
SUMMARIES OF FUELS AND MATERIALS DEVELOPMENT PROGRAMS, MATERIALS RESEARCH UNDER REACTOR PROGRAMS,
by William L. R. Rice. May 65, 84p

Descriptors: (*Reactor fuels, Fast reactors), (*Reactor materials, Reactor system components).

UCRL-10969 **Field 18J, 20L**
CFSTI Prices: HC$1.00 MF$0.50
Lawrence Radiation Lab., Univ. of California, Berkeley.
REFINEMENT OF THE CRYSTAL STRUCTURE OF MERCURIC SULFATE MONHYDRATE.
by Lieselotte Templeton, David H. Templeton, and Allan Zalkin. Aug 63, 14p
Contract W-7405-eng-48

Descriptors: (*Crystal structure, X-ray diffraction analysis), (*Mercury compounds, Sulfates).

UCRL-14599 **Field 18J, 20K**
CFSTI Prices: HC$2.00 MF$0.50
Lawrence Radiation Lab., Univ. of California, Livermore.
THE EFFECT OF STRAIN RATE ON MECHANICAL PROPERTIES OF SOME WIDELY USED ENGINEERING METALS,
by K. G. Hoge. 14 Dec 65, 36p
Contract W-7405-eng-48

Descriptors: (*Reactor materials, Mechanical properties), (*Strain (Mechanics), Metals).

UCRL-14724 **Field 18J**
CFSTI Prices: HC$1.00 MF$0.50
Lawrence Radiation Lab., Univ. of California, Livermore.
PHYSICAL AND MECHANICAL PROPERTIES OF U-7.5 W/O NB-2.5 W/O ZR ALLOY,
by C. A. W. Peterson, and W. E. Elkington. 17 Feb 66, 12p
Contract W-7405-eng-48

Descriptors: (*Uranium alloys, Mechanical properties), (*Aging (Materials), Uranium alloys).

For abstract, see N 20 12.

WAPD-TM-455 **Field 18J, 11B, 11F**
CFSTI Prices: HC$5.00 MF$1.00
Bettis Atomic Power Lab., Pittsburgh, Pa.
HISTORY OF THE NRX REACTOR X-1-Q AND 3-N TESTS AND THE NONDESTRUCTIVE POST-IRRADIATION EXAMINATION OF THEIR PLATE-TYPE CERAMIC FUEL ELEMENTS,
by H. B. Meieran. Mar 66, 156p
Contract AT (11-1)-GEN-14

Descriptors: (*Reactor fuel elements, Ceramic materials), (*Ceramic materials, Non-destructive testing).

For abstract, see N 20 13.

WAPD-292 **Field 18J**
CFSTI Prices: HC$3.00 MF$0.50
Bettis Atomic Power Lab., Pittsburgh, Pa.
EVALUATION OF LOW-DENSITY SINGLE-PHASE CUBIC Zr02 ; U02 FUELS STABILIZED WITH Ca0,
by H. R. Warner. Jan 66, 51p
Contract AT-11-1-GEN-14

Descriptors: (*Reactor fuels, Density), (*Reactor materials, Stabilization).

WAPD-301 **Field 18J**
CFSTI Prices: HC$3.00 MF$0.75
Bettis Atomic Power Lab., Pittsburgh, Pa.
THE HOMOGENIZATION AND DENSIFICATION OF ZRO2 ; UO2 FUELS UNDER IRRADIATION,
by R. M. Berman. Jan 66, 63p
Contract AT (11-1)-GEN-14

Descriptors: (*Reactor fuels, Reactor lattice parameters), (*Reactor system components, Reactor materials).

For abstract, see N 20 12.

WCAP-3385-6 **Field 18J, 18I**
CFSTI Prices: HC$2.00 MF$0.50
Westinghouse Electric Corp., Pittsburg, Pa. Atomic Power Div.
SAXTON PLUTONIUM PROGRAM.
Quarterly progress rept 31 Dec 65, Jan 66, 27p EURAEC-1534
Contract AT (30-1)-3385

Descriptors: (*Pressurized water reactors, Reactor fuels), (*Reactor fuels, Plutonium).

Identifiers: Saxton.

Y-1508 **Field 18J, 11I, 13H**
CFSTI Prices: HC$2.00 MF$0.50
Union Carbide Corp., Oak Ridge, Tenn. Y-12 Plant.
POLYVINYL PLASTISOL QUALITY STUDY,
by C. R. Schmitt. 9 Mar 66, 20p
Contract W-7405-ENG-26

Descriptors: (*Polyvinyl chloride, Qulity control), (*Platicizers, Defects (Materials)).

Y-1508 **Field 18J, 11I, 13H**
CFSTI Prices: HC$2.00 MF$0.50
Union Carbide Corp., Oak Ridge, Tenn. Y-12 Plant.
POLYVINYL PLASTISOL QUALITY STUDY,
by C. R. Schmitt. 9 Mar 66, 20p
Contract W-7405-ENG-26

Descriptors: (*Polyvinyl chloride, Quality control), (*Plasticizers, Defects (Materials)).

Y-1510 **Field 18J**
CFSTI Prices: HC$2.00 MF$0.50
Union Carbide Corp., Oak Ridge, Tenn. Y-12 Plant.
POWER METALLURGY OF URANIUM MONOCARBIDE,
by C. R. Schmitt. 13 Apr 66, 33p
Contract W-7405-eng-26

Descriptors: (*Uranium compounds, Carbides), (*Powder metallurgy, Reactor fuels).

For abstract, see N 20 12.

ANL-6975 **See Field 13H**

ANL-6981 **See Field 18I**

ANL-6992 **See Field 7A**

ANL-7152 **See Field 18D**

BMI-1757 **See Field 18B**

BMI-1765 **See Field 11F**

BNL-887 **See Field 18I**

BNWL-113-12 **See Field 7E**

BNWL-113-13 **See Field 7E**

BNWL-189 **See Field 18I**

BNWL-190 **See Field 11F**

CONF-650217 **See Field 18I**

DP-996 **See Field 11F**

IDO-17146 **See Field 18I**

IITRI-578P22-14 **See Field 18I**

LA-3482 **See Field 18I**

NAA-SR-11193 **See Field 18I**

NAA-SR-11502 **See Field 22C**

NAA-SR-11628 **See Field 18I**

NBL-230 **See Field 7E**

NBL-231 **See Field 18B**

NYO-10295 **See Field 18I**

ORNL-3900 **See Field 7E**

ORNL-3925 **See Field 12B**

PB-169 891 **See Field 7E**

RL-SEP-414 **See Field 18I**

SC-RR-65-569 **See Field 7D**

TID-20400 **See Field 7A**

WAPD-MRP-114 **See Field 18I**

WAPD-MRP-115 **See Field 18I**

WAPD-TM-483 **See Field 18I**

WCAP-3385-5 **See Field 18H**

WCAP-6079 **See Field 18I**

18K. REACTOR PHYSICS

AD-634 563 **Field 18K**
CFSTI Prices: HC$3.00 MF$0.75
Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
NEUTRON TRANSPORT CALCULATIONS ON AIR FORCE NUCLEAR ENGINEERING TEST REACTOR.
Master's thesis,
by David R. Floyd. Mar 66, 93p GSP/Phys-66-

Descriptors: (*Test reactors, Neutron transport theory), (*Heterogeneous reactors, Neutron transport theory), Neutron flux, Numerical analysis, Programming (Computers), Integral equations, Iterative methods, Gold, Neutron reactions.

Identifiers: Air Force Nuclear Engineering Test Facility.

Neutron transport flux calculations are performed on the test cells of the Air Force Institute of Technology Nuclear Engineering Test Facility at Wright-Patterson Air Force Base, Ohio. The calculations are performed by a computer code, written by the author, which uses a three energy group, discrete S-4 approximation of the Boltzmann transport equation in XY-geometry. An iterative procedure having the total fission source production as the eigenvalue is used by the computer code to solve the derived discrete SN difference equations numerically. The code is written in Fortran IV language for the IBM 7094 coupled system. The results obtained by the code calculations are compared with the results from gold foil experiments. Theses results are in good agreement. (Author)

ANL-7110 **Field 18K**
CFSTI Prices: HC$7.22 MF$2.00
Argonne National Lab., Ill.
REACTOR PHYSICS DIVISION ANNUAL REPORT, JULY 1, 1964-JUNE 30, 1965.
Dec 65, 422p
Contract W-31-109-eng-38

Descriptors: (*Thermal reactors, Neutron scattering), (*Neutron scattering, Fast reactors).

For abstract, see T 66 15.

GA-5798 **Field 18K**
CFSTI Prices: HC$5.00 MF$1.25
General Atomic, San Diego, Calif. John Jay Hopkins Lab. for Pure and Applied Science.
INTEGRAL NEUTRON THERMALIZATION.
Annual summary rept, 1 Oct 63-30 Sep 64.
by J. R. Beyster, J. R. Brown, and N. Corngold.
15 Oct 64, 227p
Contract AT (04-3)-167

Descriptors: (*Thermal utilization, Thermal neutrons), (*Thermal neutrons, Neutron scattering).

NAA-SR-MEMO-10544 **Field 18K**
CFSTI Prices: HC$2.00 MF$0.75
Atomics International, Canoga Park, Calif.
MAG -- A PROGRAM TO PREPARE FAST GROUP CROSS SECTIONS IN THE DTF FORMAT,
by R. S. Hubner. 6 Nov 64, 45p
Contract AT-11-1-GEN-8

Descriptors: (*Programming (Computers), Fast neutrons), (*Thermal neutrons, Neutron transport theory).

Identifiers: MAG.

NAA-SR-10951 **Field 18K, 9B**
CFSTI Prices: HC$2.45 MF$0.75
Atomics International, Canoga Park, Calif.
DTF-II -- A ONE-DIMENSIONAL, MULTIGROUP NEUTRON TRANSPORT PROGRAM,
by W. W. Engle, M. A. Boling, and B. W. Colston.
25 Mar 66, 103p
Contract AT-11-2-GEN-8

Descriptors: (*Neutron transport theory, Programming languages), (*Programming (Computers), Neutron transport theory).

Identifiers: DTF-II.

NAA-SR-11530 **Field 18K, 12A**
CFSTI Prices: HC$3.00 MF$0.75
Atomics International, Canoga Park, Calif.
THE CALCULATION OF SLOWING-DOWN TRANSFER MATRICES IN THE SPHERICAL HARMONICS REPRESENTATION,
by Bruce D. O'Reilly, and Richard C. Lewis. 25 Mar 66, 74p
Contract AT (11-1)-GEN-8

Descriptors: (*Neutron cross sections, Special functions), (*Critical assemblies, Reactor kinetics).

PB-169 359 **Field 18K, 18M**
CFSTI Prices: HC$3.60 MF$0.50
Commissariat a L'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
MESURES DU COEFFICIENT DE DIFFUSION RADIAL DANS AQUILON II PAR L'ETUDE DE LA DISTORSION DE LA STRUCTURE FINE (Measurement of the Radial Diffusion Constant at Aquilon II by Means of the Study of the Distortion of the Fine Structure),
by Philippe Gaunet, and Michel Mazarakis. Dec 65, 37p CEA-R-2889
Text in French; Attached Summary in English.

Descriptors: (*Heavy water reactors, Neutron flux), (*Research reactors, Neutron flux), (*Neutron flux, Measurement), Neutron transport theory, Reactor lattice parameters, Deformation, Reactor fuels, Diffusion, France.

Identifiers: Saclay reactors (Aquilon II).

The report gives several measurements of the radial diffusion constant of thermal neutrons by means of the study of the interaction of macroscopic flux and of fine structure in Aquilon II. The use of two type of clusters permitted the comparison of the effect of the fuel distribution on the radial diffusion constant. Two types of measurement were used: (1) macroscopic or 'amont-aval' method in which the perturbation brought by the microscopic flux on the macroscopic flux is measured; (2) microscopic or 'fine structure' method, which analyses the distortion of the fine structure of a cell under the effect of the macroscopic flux. (Author)

PB-169 460 **Field 18K, 9B**
CFSTI Prices: HC$3.00 MF$0.75
Institutt for Atomenergie, Kjeller (Norway).
BIGG-II. A MULTIGROUP NEUTRON SPECTRUM AND CRITICALITY CODE,
by O. P. Tverbakk, and J. M. Dodderlein. Sep 65, 72p KR-75

Descriptors: (*Neutron spectrum, Programming (Computers)), (*Critical assemblies, Programming (Computers)), (*Programming (Computers), Nuclear reactors), (*Heterogeneous reactors, Reactor lattice parameters), Approximation (Mathematics), Fast neutrons, Thermal neutrons, Nuclear resonance, Absorption, Fission, Nuclear cross sections, Diffusion, Norway.

Identifiers: Bigg- II program.

BIGG-II is a multigroup neutron spectrum and criticality- homogeneous reactor code in FORTRAN-63 based on BIGG-I. It applies the B-1 or P-1 approximation with extended Greuling-Goertzel slowing down. Input data requirements were formulated that permit flexibility in the choice of physical approximations applied in homogenizing heterogeneous reactor lattices. A thermal neutron energy group is included. Input data for this are given explicitly. The calculation of resonance absorption and resonance fission has been improved, as compared to BIGG-I, for better consistency with available resonance integrals. All fundamental nuclear data are contained in a cross-section library. Output is extensive and includes a.o. multigroup flux, leakage and slowing down spectra, elementwise absorption and production and few group diffusion constants as well as multiplication factor and criticality parameters. (Author)

PB-169 881 **Field 18K, 18M, 9B**
CFSTI Prices: HC$7.60 MF$0.75
Institutt for Atomenergi, Kjeller (Norway).
DATAPREP-II. A REACTOR LATTICE HOMOGENEIZATION AND BIGG-II DATA PREPARATION COMPUTER CODE,
by R. J. J. Stamm'ler, O. P. Tverbakk, Z. Weiss, and J. M. Doderlein. Dec 64, 71p KR-78

Descriptors: (*Reactor lattice parameters, Programming (Computers)), (*Programming (Computers), Reactor lattice parameters), (*Heterogeneous reactors, Programming (Computers)), (*Thermal reactors, Programming (Computers)), Reactor kinetics, Neutron reactions, Nuclear resonance, Reactor fuels, Buckling (Neutron density), Instruction manuals, Norway.

The report describes in detail the physics of the DATAPREP-II computer code. This code provides a reactor lattice homogeneization in the fast, resonance and thermal energy ranges, allowing heterogeneous thermal reactors to be treated by standard homogeneous multigroup codes. A User's Manual is also provided, including a test case. The code is written to 100% in FORTRAN-63 for the CDC-3600 computer at the Kjeller Computer Installation (KCIN). (Author)

BNL-887 **See Field 18I**

IDO-17104 **See Field 18D**

IDO-17107 **See Field 20H**

KY-L258 (Rev-1) **See Field 18J**

LA-3383 **See Field 18F**

NAA-SR-11356 **See Field 18D**

ORNL-3900 **See Field 7E**

ORNL-3920 **See Field 12A**

WAPD-MRP-114 **See Field 18I**

WAPD-MRP-115 **See Field 18I**

18L. REACTORS (POWER)

AD-634 455 **Field 18L, 18I, 18E, 5E K**
CFSTI Prices: HC$3.00 MF$0.75
Human Engineering Labs., Aberdeen Proving Ground, Md.
CONTROL-CAB DESIGN FOR ML-1A NUCLEAR POWER PLANT: HUMAN ENGINEERING CONSIDERATIONS.
Technical memo.,
by B. Lawrence Sova Jr. Oct 65, 102p TM-15-65

Descriptors: (*Nuclear power plants, *Reactor control), (*Human engineering, Reactor control), Mobile, Heterogeneous reactors, Power reactors, Gas-cooled reactors.

Identifiers: Army reactors (ML-1).

The report summarizes the human engineering considerations in the preliminary detailed design of the ML-1A control cab. It discusses the pros and cons of alternate designs for the cab interior and the cab sub-system, with conclusions. (Author)

AD-634 506 **Field 18L**
CFSTI Prices: HC$3.00 MF$0.75
Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
A CRITICALITY ANALYSIS OF THE ROMASHKA REACTOR.
Master's thesis,
by William Mark Hodgson. Jun 66, 95p GSP/PH/66-10

Descriptors: (*Power reactors, *Critical assemblies), (*Fast reactors, Power reactors), Reactor lattice parameters, Analysis.

Identifiers: Theses, Romashka reactor.

A criticality analysis is performed on the Romashka reactor in an effort to establish the critical fuel loading and flux distribution. The analysis is in support of a complete engineering study designed to confirm or refute data on the Romashka configuration. Transport theory is used because of the small size and many interdependent regions of the system. A conservative S sub n difference equation is derived from the Boltzman transport equation. The equation is solved using rotational reflectional invariant quadrature for the differenced angular dependence. A code, RZSN, was written, and another code, TDSN, was used. Calculations were made using Hansen and Roach sixteen group cross sections with TDSN, and three group cross sections with RZSN. 49.00 and 71.08 kg. U235 loadings were found to be supercritical with TDSN. A critical mass of 55.87 kg. is predicted with RZSN. Discrepancies are found between 'known' fuel loading and 'known' physical dimensions. The validity of the results is discussed, and directions for further investigation indicated. (Author)

AD-634 590 **See Field 18I**

AD-634 621 **See Field 18D**

AGN-TM-412 **See Field 18F**

BNL-887 **See Field 18I**

BNWL-113-13 **See Field 7E**

CEND/PRWRA-257 **See Field 18I**

CEND/PRWRA-257A **See Field 18I**

DP-1015 **See Field 18B**

NAA-SR-11628 **See Field 18I**

NMI-7263 **See Field 18E**

66-1-RE **Field 18L, 7A, 13B**
CFSTI Prices: HC$2.00 MF$1.75
Kaiser Engineers, Oakland, Calif.
ENGINEERING FEASIBILITY AND ECONOMIC STUDY FOR DUAL-PURPOSE ELECTRIC POWER-WATER DESALTING PLANT FOR ISRAEL.
Jan 66, 302p
Prepared in cooperation with Catalytic Construction Co., Philadelphia, Pa.

Descriptors: (*Power reactors, Distilling plants), (*Sea water, Desalination).

For abstract, see N 20 12.

SC-CR-66-2017 **See Field 21F**

TID-22330 **See Field 18I**

TID-22350 **See Field 10A**

WAPD-MRP-114 **See Field 18I**

WAPD-MRP-115 **See Field 18I**

WCAP-3385-5 **See Field 18H**

WCAP-6079 **See Field 18I**

18M. REACTORS (NON-POWER)

ANL-7152 **See Field 18D**

IDO-17135 **See Field 18I**

IDO-17158 **See Field 18I**

PB-169 359 **See Field 18K**

PB-169 881 **See Field 18K**

TID-21288 **See Field 18E**

TID-21596 **See Field 18E**

18N. SNAP TECHNOLOGY

NAA-SR-MEMO-10667 **Field 18N**
CFSTI Prices: HC$2.00 MF$0.50
Atomics International, Canoga Park, Calif.
SNAP 10A PBSNTE T/E PUMP S/N-038 ACCEPTANCE TEST.
by C. M. Quirk, and T. M. Funakura. 4 Nov 64, 26p
Contract AT-11-1-GEN-8

Descriptors: (*Auxiliary power plants, Pumps), (*Reactor start-up sources, Auxiliary power plants).

BNWL-113-13 **See Field 7E**

NAA-SR-11502 **See Field 22C**

NAA-SR-11762 **See Field 18D**

SC-RR-65-472 **See Field 22C**

19A. AMMUNITION, EXPLOSIVES, AND PYROTECHNICS

AD-634 414 **Field 19A, 8I**
CFSTI Prices: HC$1.00 MF$0.50
Army Foreign Science and Technology Center, Washington, D. C.
PRIMERS AND EXPLOSIVES.
Jun 66, 19p FSTC-HT-23-110-66
Proj. 2301-6553
TT-66-61514
Trans. of Vzryvnoe Delo (USSR) n55 p93-97, 132-35, 136-39 1964.

Descriptors: (*Primers, Detonations), (*Explosive materials, Detonations), (*Detonations, Velocity), Detonators, Ammonium compounds, Nitrates, Nitroglycerin, Mining engineering, USSR.

Three papers describe methods for determining the detonating capacity of primers, the detonation characteristics of certain nitroglycerine explosives, and the properties of several new Soviet explosives used in mining and blasting operations. Graphical data on detonation velocities are presented and tabular information is given on the performance of various explosives developed in recent years. (Author)

AD-634 446 **Field 19A, 16C**
CFSTI Prices: HC$2.00 MF$0.50
Stresau (R.) Lab., Inc., Spooner, Wis.
SMALL EXPLOSIVE TRAIN FOR MISSILE SAFETY AND ARMING DEVICE,
by R. L. Degner, and R. H. Stresau. 15 May 66, 35p RSLR-64-9-1
Contract N123 (62738)31089A
NAVWEPS-8838

Descriptors: (*Explosive trains, *Guided missile fuzes), Miniature fuzes, Arming devices, Explosive materials, RDX, Lead compounds, Safety devices, Azides, Detonators, Boosters, Reliability, Statistical analysis, Redundant components.

Identifiers: Varicomp explosives.

As the result of a feasibility study on reducing the dimensions of out-of-line safety fuze explosive trains, a system 1/2 in. long and 1/4 in. in diameter with two-train redundancy is proposed, which from statistical extrapolation is calculated to meet the Navy standard of 'less than one safety failure in a million' at a 95% confidence level. (Author)

AD-634 602 **Field 19A, 19D**
CFSTI Prices: HC$1.00 MF$0.50
Naval Ordnance Lab., White Oak, Md.
THE DETONATION BEHAVIOR OF HYDRAZINE MONONITRATE,
by Donna Price, T. P. Liddiard Jr. and R. D. Drosd. 15 Apr 66, 21p NOLTR-66-31
Task RMMO-62-058/212-1/F008-08-11

Descriptors: (*Hydrazine derivatives, *Detonations), Explosive materials, Nitrates, Velocity, Density, Geometric forms, Reliability.

Identifiers: Hydrazine nitrate.

Data obtained some time ago on the detonation velocity (D) - loading density (RHO-NULL) - charge diameter (d) relationships of hydrazine mononitrate were reassessed. They are reported in detail for the first time. The infinite diameter curve is D (mm/microsec)= 5.388 (RHO-NULL) - 0.100, where RHO-NULL is in g/cc. At finite diameters of 1.27 to 4.14 cm, the D vs RHO-NULL curves exhibit maxima. This behavior is to be expected of explosives whose critical diameter increases with increasing loading density, the reverse of the trend exhibited by common explosives such as TNT. Hydrazine mononitrate can therefore be classified as belonging to a group of explosives showing the atypical behavior described. (Author)

AD-634 629 **Field 19A, 7B**
CFSTI Prices: HC$1.00 MF$0.50
Picatinny Arsenal, Dover, N. J. Explosives Lab.
MECHANISM FOR CONTROLLING THE REACTIVITY OF LEAD AZIDE,
by Vencatesh R. Pai-Verneker, and Arthur C. Forsyth. Jun 66, 13p.
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Azides, Sensitivity), Lead compounds, Particle size, Preparation, Impurities, Iron, Thermal properties, Crystal lattice defects, Surface properties, Doping, Ions, Nitrites.

Identifiers: Lead nitrite, Hydrazoic acid.

The object was to determine how the reactivity (sensitivity) of alpha-PbN6 is influenced by particle size, the incorporation of an impurity (iron), and the method of preparation of alpha-PbN6. It was shown that (1) the sensitivity of alpha-PbN6 increases as the surface area increases, (2) iron can be carried by alpha-PbN6 either as Fe3+or as (FeN3)2+, (3) when iron is incorporated as Fe3+up to 0.01 mole % (acidic medium) it is possible to desensitize alpha-PbN6, (4) when iron is carried by alpha-PbN6 as (FeN3)2+a very marked sensitization results and (5) a change in the optical absorption of alpha-PbN6 is also caused by iron doping. Alpha-PbN6 prepared from lead nitrite and hydrazoic acid is the least sensitive and the absorption edge of this preparation is at 300 m millimicrons in contrast to 420 m millimicrons which is the absorption edge of alpha-PbN6 prepared by other conventional methods. (Author)

AD-634 642 **Field 19A**
CFSTI Prices: HC$1.00 MF$0.50
Army Combat Developments Command Artillery Agency, Fort Sill, Okla.
A MODEL FOR DETERMINING TARGET LOCATION ACCURACY REQUIREMENTS,
by Otis S. Spears. Jun 66, 13p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings avail-

able in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Projectiles, Target acquisition), (*Target acquisition, Military requirements), Kill probabilities, Mathematical models, Errors, Artillery.

The study encompasses a method of determining target location accuracy requirements when other components of the weapon system are specified. The method is primarily developed for surface-to-surface artillery weapons, but is adaptable to other systems.

AD-634 661 **Field 19A, 7E**
CFSTI Prices: HC$1.00 MF$0.50
Picatinny Arsenal, Dover, N. J. Explosives Lab.
STUDY OF LOW FREQUENCY MOLECULAR MOTIONS IN EXPLOSIVES BY SLOW NEUTRON INELASTIC SCATTERING,
by Henri P. Boutin, Henry J. Prask, and Samuel Trevino. Jun 66, 14p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Explosive materials, *Neutron spectrum), (*Neutron scattering, Explosive materials), Inelastic scattering, Molecular properties, Neutron diffraction analysis, HMX, RDX, Styphnates, Nitrophenols, Lead compounds, Sensitivity.

Identifiers: Lead styphnate, Picric acids, Styphnic acids.

The inelastic scattering of neutrons provides a means of studying explosives by which the nature of molecular motions can be determined and through which molecular dynamics can be correlated with macroscopic properties such as thermodynamic quantities. A tentative correlation was made between explosive sensitivity and internal energy for four explosives. The results show the importance of understanding the microscopic behavior in order to predict explosive characteristics. (Author)

PB-169 979 **Field 19A**
CFSTI Price: HC$3.60
Ballistic Research Labs., Aberdeen Proving Ground, Md.
A STUDY OF JETS FROM SCALED CONICAL SHAPED CHARGE LINERS.
Memo. rept.,
by R. DiPersio, J. Simon, and T. H. Martin. Aug 60, 34p BRL-MR-1298
Proj. DA-5B03-04-009
AD-246 352

Descriptors: (*Shaped charge jets, Cavity liners), (*Cavity liners, Shaped charge jets), Radiography.

Triple flash radiographs of jets from three scaled shaped charges containing copper cones with apex angle of 42 degrees are analyzed. The performance of jet particles was determined by numbering particles as shown on time sequenced radiographs, and obtaining their velocity. Penetration characteristics of jets in terms of the action of these discrete particles are described. (Author)

AD-468 333 **See Field 21B**

AD-479 637 **See Field 7A**

AD-479 639 **See Field 7A**

AD-479 670 **See Field 7D**

AD-634 307 **See Field 19D**

AD-634 655 **See Field 20E**

UCRL-14431 **See Field 18C**

19C. COMBAT VEHICLES

AD-477 647 **See Field 51**

19D. EXPLOSIONS, BALLISTICS, AND ARMOR

AD-634 237 **Field 19D, 4B**
CFSTI Prices: HC$3.00 MF$0.50
Travelers Research Center, Inc., Hartford, Conn.
BALLISTIC WINDS STUDY.
Quarterly rept. no. 3, Dec 65-Mar 66,
by Frederick P. Ostby Jr. Jun 66, 57p
Contract DA-28-043-AMC-01377 (E)
Proj. DA-1V0-25001-A-126-01
ECOM-01377-3
See also AD-629 277.

Descriptors: (*Weather forecasting, Military requirements), (*Wind, *Exterior ballistics), Meteorological parameters, Programming (Computers).

Identifiers: Ballistic meteorology, CRAM program.

An objective analysis technique known as CRAM (Conditional Relaxation Analysis Method) has been programmed for the IBM 7090 to compute ballistic winds, temperature, and density over a region of southeastern Arizona in the vicinity of Ft. Huachuca. The various components and available options of the program are described. A set of analyses produced from initial tests is shown and the ballistic quantities derived are compared with those of the previous quarterly report. Corrections based on a single station (Ft. Huachuca) were applied to concurrent artillery firings for 19 cases. The residual errors derived from these cases will be used as a control for later experiments. The distribution of the residual errors relative to the target strongly suggests a bias in range errors, the average impact location being nearly 200 meters beyond the target. (Author)

AD-634 307 **Field 19D, 21B, 19A**
CFSTI Prices: HC$1.00 MF$0.50
Department of the Navy, Washington, D. C.
ON THE TRANSITION OF BURNING OF EXPLOSIVES TO DETONATION,
by K. K. Andreev. 1966, 23p Translation-2143
TT-66-61503
O Perekhode Goreniya Vzryvchatykh Veshchestv vo Vzryv, trans. of Vzryvnoe Delo (USSR) n52/9 p130-40 1963.

Descriptors: (*Explosive materials, Detonations), (*Detonations, Dynamics), (*Combustion, Explosive materials), Burning rate, Transformations, Acceleration, Combustion products, Particle size, Density, Powders, Liquids, USSR.

Topics include: Factors determining the possibility of the transition from burning to detonation; characteristics of self-acceleration of burning of powdered explosives; influence of particle size and powder density on the transition from burning to detonation; transition of burning to detonation in liquid explosives.

AD-634 468 **Field 19D**
CFSTI Prices: HC$13.60 MF$1.00
Illinois Univ., Urbana.
AIR BLAST EFFECTS ON UNDERGROUND STRUCTURES,
by N. M. Newmark, and G. K. Sinnamon. Jan 54, 134p
Contract DA-49-129-eng-239
AEC-WT-727
Rept. on Operation Upshot-Knothole, Nevada Proving Grounds, Mar-Jun-53, Project 3.8.

Descriptors: (*Air burst, Nuclear explosion damage), (*Underground structures, *Nuclear explosion damage), Reinforced concrete, Air burst, Nuclear explosions, Shock waves, Pressure, Soil mechanics, Deflection, Attenuation.

Identifiers: Upshot-Knothole operation.

The report describes the results of a test to determine the nature of forces transmitted through earth to buried structures from the explosion in air of an atomic bomb. The structures were primarily reinforced concrete boxes having a large number of simply supported steel beam strips forming their roofs. Three structures were included in the program, having respectively 1 ft, 4 ft, and 8 ft of earth cover over the beam strips, and each of the structures had a number of individual beam strips, with several strips of each of three different degrees of flexibility to provide information concerning the effect of flexibility of the structure on the loading transmitted to it. All of the beam strips had the same span, namely 8 ft. The structures were tested in two shots, the first producing an overpressure level of about 15 psi, and the second about 63 psi.

AD-634 525 **Field 19D, 1C**
CFSTI Prices: HC$2.00 MF$0.50
Aerojet-General Corp., Azusa, Calif.
DESIGN STUDY AND FABRICATION OF TWO INTERCHANGEABLE UH-1 AIRCREW ARMOR SYSTEMS.
Final rept., 21 Jul 64-2 Aug 65,
by D. Fernandez, and H. W. Sheldon. Apr 66, 52p AGC-2950
Contract DA-44-177-AMC-224 (T)
Task 1P121401A1500301
USAAVLABS-TR-66-23

Descriptors: (*Armor, Helicopters), Armor piercing ammunition, Aircraft seats, Aviation personnel, Design, Antiaircraft ammunition, Terminal ballistics, Stresses, Impact shock, Projectiles.

Identifiers: H-1 aircraft.

The design and evaluation of two interchangeable UH-1 aircrew armor systems capable of defeating 7.62mm, .30-caliber, and .50-caliber AP ammunition are described. The design features of the systems are described, and a structural analyssis of the system is presented. (Author)

AD-634 649 **Field 19D, 20D**
CFSTI Prices: HC$1.00 MF$0.50
Springfield Armory, Mass.
ACOUSTICAL AND VISUAL ATTENUATION THROUGH DYNAMIC REGULATION OF MUZZLE GAS FLOW,
by Wayne H. Watling. Jun 66, 15p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Interior ballistics, *Gas flow), Noise, Propellant flashes, Attenuation, Gun barrel attachments, Camouflage.

Identifiers: Transitional ballistics.

This paper presents the fundamental concepts of fluid flow on which to base theoretical and empirical studies in the use of weapon muzzle attachments used for flash and sound suppression. It presents the development of an improved flash suppressor for a given weapon and provides a chapter of experimental data to be added to the theoretical data published in the references. When research was initiated on this project, the paucity of published test data left the researcher with something to be desired, that is, the link between theory and reality. The paper further serves to illustrate the fact that here is a fertile field for future research in the field of fluid dynamics. As in most problem solutions, the most difficult portion is the definition of the problem itself. As coveries continue

along the theory of submerged jet flow, heat transfer, thermodynamic properties of propellants, and equations of state of gun gases, the many assumptions now being made during theoretical analysis will be replaced with fact and the area of transitional ballistics will become thoroughly defined. This will reduce the art of muzzle device development to a practical engineering science. (Author)

AD-634 228 **See Field 7D**

AD-634 602 **See Field 19A**

AD-634 631 **See Field 20D**

AD-634 672 **See Field 4B**

AD-634 695 **See Field 4B**

AD-634 696 **See Field 4B**

AD-634 726 **See Field 4B**

AD-634 727 **See Field 4B**

AD-634 738 **See Field 13M**

AD-634 752 **See Field 4B**

AD-634 757 **See Field 4B**

AD-634 760 **See Field 4B**

19E. FIRE CONTROL AND BOMBING SYSTEMS

AD-634 680 **Field 19E, 17H, 13I**
CFSTI Prices: HC$1.00 MF$0.50
Army Weapons Command, Rock Island, Ill. Future Weapons Office.
KINEMATICS OF A TRACKING GIMBAL,
by Wright K. Gannett. Jun 66, 15p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Tracking, Gimbals), (*Gimbals, Equations), Acceleration, Velocity, Torque, Guided missile tracking systems, Space surveillance systems, Theodolites, Optical sights, Mechanics.

The paper presents some formulas expressing angular positions, velocities, accelerations, and torques required about the individual axes of a two-axis gimbal system in which a tracking device swivels universally to track a moving target. These data apply to missile trackers, satellite trackers, theodolites, and optical sights of weapons -- and can be extended to the weapon itself displaced through a lead angle.

AD-634 350 **See Field 5I**

19F. GUNS

AD-477 645 **Field 19F, 5I**
CFSTI Prices: HC$2.60 MF$0.50
Human Resources Research Office, George Washington Univ., Alexandria, Va.
THE EFFECT OF FLINCHING ON M1 RIFLE MARKSMANSHIP.
Staff memo.
by Eugene F. MacCaslin, and Leo Levy. May 56, 23p
Contract DA-44-188-ARO-2

Descriptors: (*Small arms, Performance (Human)), (*Automatic weapons, Performance (Human)), Gunnery, Reliability, Military training, Army training, Firing tests (Ordnance), Reaction (Psychology), Stress (Psychology), Behavior.

This report summarizes two preliminary studies on the effect of flinching on marksmanship. The chief purpose of the first study was to determine whether or not the judgments of experts will serve as reliable measures of flinching; the second study was an attempt to find out the extent to which flinching affects marksmanship scores. Interpretation of the results of both studies indicates that expert judgments will measure flinching reliably, and that flinching significantly affects marksmanship. In fact, the data suggest that about 38% of the variation in trainee marksmanship scores is due to flinching. Hence the problem appears to be serious enough to show a need for research into possible methods of reducing flinch.

19G. ROCKETS

AD-449 417 **Fiel d 19G**
CFSTI Price: HC$6.60
Human Engineering Labs., Aberdeen Proving Ground, Md.
DEVELOPMENT OF A ROCKET-BLAST SIMULATOR: DESIGN AND TEST,
by Edsel A. Spellman. Feb 64, 69p Technical memo. TM-4-64

Descriptors: (*Rocket launching, Blast), (*Exhaust gases, Hazards), (*Rocket launchers, Man), Simulators, Design, Military personnel, Stresses, Safety, Captive tests, Weight, Pressure, Performance (Engineering), Valves, Diaphragms (Mechanics), Tests.

This report describes the engineering design, development, and testing of a facility used to simulate the effects of rocket blast upon military personnel. The most formidable problems encountered were (1) the necessity of achieving a high-order reliability to assure safety, and (2) the requirements for a total pressure rise within five milliseconds to achieve high blast impulse. Both of these problems were resolved through the design of a novel side-mounted valve actuated by a sudden pressure differential resulting from the bursting of a pressurized diaphragm. (Author)

20A. ACOUSTICS

AD-456 708 **Field 20A**
CFSTI Price: HC$2.60
Navy Underwater Sound Lab., New London, Conn.
NEARFIELD SOUND PRESSURE ON SQUARE AND RECTANGULAR ARRAYS WITH BEAM STEERING.
Research rept.,
by Norman T.Chin. 13 Jan 65, 27p USL-634
Projs. S-R001-01-01, S-F001-03-18
Tasks 0401, 11213

Descriptors: (*Transducers, Acoustics), (*Acoustifcs, Transducers), Steering, Electronic scanners, Cavitation, Sound, Pressure, Numerical analysis.

In this report, square and rectangular radiators are to be considered as models of arrays of closely packed rectangular transducers. The distribution of the nearfield sound pressure on the surface of an array is shown to be affected by the steering of the main beam of the farfield pattern. The numerical results show that the pressures pile up near the leading edge of the array as the beam is steered to a large angle. Expressions of the nearfield pressure are derived for an infinitely long rectangular strip and a finite, slender, rectangular array with end-fire beam steering across the width and along the longer side, respectively. The numerical data of the pressure on various finite, steered arrays are determined by an electronic computer for steering angles other than the end fire. (Author)

AD-634 202 **Field 20A, 11C, 17A, 13J K**
CFSTI Prices: HC$1.00 MF$0.50
Naval Applied Science Lab., Brooklyn, N. Y.
ACOUSTIC IMPEDANCE TUBE FOR STUDY OF ANECHOIC COATINGS.
Progress rept.,
by D. H. Kallas. 1 Jun 66, 7p FR-68, PR-1
Proj. SR-011-01-01
Task 0401

Descriptors: (*Coatings, Acoustic impedance), (*Acoustic impedance, Test equipment), Sound, Propagation, Mathematical analysis, Pipes, Theory, Design, Sonar equipment, Materials, Acoustic properties, Submarine hulls.

Identifiers: Anechoic coatings, Impedance tubes.

A mathematical study was made related to theory and design of acoustic impedance tubes. These devices, based on the propagation of sound waves in water, are commonly used for the study of acoustic properties of materials. The study was preliminary to design and construction of an impedance tube for use in a sonar materials program at NASL. The report consists of a descriptive summary of the developed mathematical analysis. The complete analysis is contained in AD-634 203. (Author)

AD-634 203 **Field 20A, 11C, 17A, 13J K**
CFSTI Prices: HC$3.00 MF$0.75
Naval Applied Sciences Lab., Brooklyn, N. Y.
ANECHOIC COATING PROJECT: REPORT ON THE DETERMINATION OF ACOUSTIC PROPERTIES OF MATERIALS BY PROPAGATION OF WAVES IN WATER FILLED TUBES,
by Jean Mariani. 1965, 63p FR-68, Pr-1-Enc-1
See also AD-634 202.

Descriptors: (*Coatings, Acoustic impedance), (*Acoustic impedance, Test equipment), (*Sound, Propagation), Mathematical analysis, Pipes, Mechanical waves, Equations, Equations of state, Partial differential equations, Water, Sonar equipment, Materials, Acoustic properties, Submarine hulls.

Identifiers: Anechoic coatings, Impedance tubes.

The first part concerns itself with the development of the wave equation in its general form. In order to apply the wave equation to the analysis of sound waves in water filled tubes, the equation is converted from Cartesian to cylindrical coordinates. It is then shown that the wave equation is separable and that its solution may be represented as the product of four distinct functions, each related to only one variable. The general solution to the wave equation is then shown to be a complex waveform being simultaneously propagated along the longitudinal and radial axes of the tube as well as in the theta-space. It is shown that the wave equation reduces to a plane wave, that is, one which is propagated along the longitudinal axis of the tube only. It is further shown that, as the radial waves form a discontinuous series of frequencies, a certain minimum frequency must not be exceeded in order to maintain plane monochromatic waves. The final part deals with the application of theory to sound waves in water filled tubes.

AD-634 378 **Field 20A, 9D, 17B**
CFSTI Prices: HC$1.00 MF$0.50
Tufts Univ., Medford, Mass. Dept. of Mechanical Engineering.
A STUDY OF ACOUSTICAL MULTIPATH SYSTEMS. SECTION I. THEORY AND PROGRAM.
Final rept.,
by Dwight W. Batteau. 1 Jun 66, 8p
Contract Nonr-494 (00)

Descriptors: (*Speech recognition, *Acoustics), (*Information theory, Speech recognition), Speech transmission, Multipath transmission, Signal-to-noise ratio, Acoustic equipment.

The report investigates the effects of multiple paths on acoustical signals as related to speech

recognition and improvement of signal-to-noise ratios. The basic theoretical structure being applied to the effects of multiple acoustical paths is derived principally from information theory and its associated field of transformations as encodings.

AD-634 644 **Field 20A, 20D, 1B**
CFSTI Prices: HC$1.00 MF$0.50
Southampton Univ. (England).
HELICOPTER BLADE SLAP,
by F. Webb Taylor, and John W. Leverton. Jun 66, 15p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Rotor blades (Rotary wings), *Propeller noise), Helicopters, Vortices, Aerodynamic characteristics, Aerodynamic loading, Great Britain.

The paper considers a possible mechanism for the generation of blade slap. A simplified theory for this is presented which shows good agreement with the results obtained from a test rig on which blade slap was simulated. In particular it shows that the noise is dependent on the fourth power of the velocity and the square of the gust size (vortex strength). The results are sufficiently encouraging to warrant the extension of the analysis to that of an actual helicopter. Normally, blade element velocity in a helicopter can not be varied appreciably; it is fixed by far more important aerodynamic considerations. The profile of a vortex and its path are very important considerations that may possibly be partially controllable. Because the noise increases with the square of the vortex velocity amplitude (W), highly loaded rotor blades, which produce a strong tip vortex have a greater penchant toward loud blade slap. This contributes to the severity of the blade slap on the IROQUOIS which has a highly loaded two-bladed rotor. (Author)

AD-634 707 **Field 20A, 14B**
Navy Underwater Sound Reference Lab., Orlando, Fla.
GENERAL RECIPROCITY PARAMETER.
Research rept.,
by Robert J. Bobber. 1966, 11p USRL-RR-84

Descriptors: (*Electroacoustic transducers, Calibration), Acoustics, Acoustic equipment.

Identifiers: Reciprocity calibration.

The reciprocity parameter used in the reciprocity calibration of electroacoustic transducers is derived for the general case of arbitrary boundary conditions and arbitrary definitions of responses. A general reciprocity parameter is defined as the ratio of the volume velocity emanating from a surface defined in the transmitting response to the resulting pressure averaged over a surface defined in the receiving response. It is shown how the general parameter concept leads directly and simply to the various special parameters for the cases of spherical waves, cylindrical waves, plane waves, diffuse sound, couplers, and tubes. Application of the concept to in situ and nearfield conditions is also described. (Author)

AD-634 249 **See Field 17A**

AD-634 278 **See Field 21I**

AD-634 296 **See Field 21I**

AD-634 546 **See Field 17A**

AD-634 578 **See Field 7D**

AD-634 743 **See Field 20D**

AD-634 758 **See Field 20C**

AD-634 775 **See Field 4A**

20B. CRYSTALLOGRAPHY

AD-441 383 **Field 20B, 14B**
CFSTI Price: HC$1.00
Brown Univ., Providence, R. I. Div. of Engineering.
A GENERAL METHOD FOR CALCULATING ELECTRON DIFFRACTION PATTERNS CONTAINING TWIN REFLECTIONS,
by E. S. Meieran, and M. H. Richman. May 64, 9p
Contract ARPA-E-12
ARPA-e7

Descriptors: (*Electron diffraction analysis, Crystal structure), (*Crystal structure, Electron diffraction analysis), Symmetry (Crystallography), Reflection.

A general analytical method is presented which is capable of predicting and indexing electron diffraction patterns from twinned regions of cubic crystals. This method may be used for any cubic system and any twin plane. Calculation of all twin spots, including those superimposed on matrix spots, is made possible by this method. (Author)

AD-634 572 **Field 20B, 7B**
Pittsburgh Univ., Pa. Crystallography Lab.
THE STRUCTURES OF THE ALUMINUM CARBONITRIDES.II.
by G. A. Jeffrey, and Victor Y. Wu. 11 Jun 65, 11p
Grant DA-ORD-31-124-61-G63
AROD-1176:28

Descriptors: (*Aluminum compounds, *Crystal structure), (*Nitrides, Crystal structure), (*Carbides, Crystal structure), Crystal lattices, X-ray diffraction analysis, Chemical bonds, Stereochemistry.

Identifiers: Aluminum carbonitrides, Aluminum oxycarbide.

The results of three-dimensional single-crystal structure analyses are reported for Al4C3, Al5C3N, Al6C3N2 and Al8C3N4. These structures, which with AlN and Al7C3N3 form a homologous series, have Al-Al first neighbour distances ranging from 2.56 to 3.33A, Al-C distances from 1.87 to 2.30A, and Al-N distances from 1.86 to 1.99 A. The carbon atoms are five- and six-coordinated to nearest neighbor aluminum atoms. The relationship of these structures to that of Aln, the B4 type, is discussed in terms of the inversion and shear of blocks of tetrahedral coordination polyhedra. An attempt is made to describe the electronic structure qualitatively in terms of metallic and covalent interatomic bonding. The structure of the disordered Al2CO is reinterpreted. (Author)

AD-634 627 **Field 20B, 7D, 20C**
CFSTI Prices: HC$1.00 MF$0.50
Army Engineer Research and Development Labs., Fort Belvoir, Va. Night Vision Lab.
INFLUENCE OF ELECTROMAGNETIC FIELDS ON LIQUID CRYSTALS,
by John H. Muller. Jun 66, 15p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Crystals, Liquids), (*Electromagnetic fields, Crystals), Cholesteryl esters, Phase studies, Electrical insulation, Transformations, Optical properties, Dipole moments, Molecular association.

Identifiers: Cholesteryl nonanoates, Liquid crystals.

Until now the plane texture of the cholesteric mesophase could only be affected by changing the enclosing surfaces or the temperature. This study has shown how electric fields may rapidly orient and align such mesophases. In spite of intense electric fields, remarkably stable long range molecular order persists in the mesophase of cholesteryl nonanoate. Such materials may form an interesting new class of insulators. The newly found properties make possible the further study of mesophase structure, electric dipole moments, viscoelastic properties, and the fluid dynamics of viscous materials. (Author)

AD-634 746 **Field 20B**
CFSTI Prices: HC$1.00 MF$0.50
McMaster Univ., Hamilton (Ontario). Dept. of Metallurgy and Metallurgical Engineering.
DISSOLUTION SPIRALS ON GAMMA-IRRADIATED LITHIUM FLUORIDE.
Technical rept.,
by M. B. Ives, and T. R. Ramachandran. Jun 66, 19p TR-6
Contract Nonr-3925 (00)

Descriptors: (*Lithium compounds, Fluorides), Etched crystals, Iron, Ions, Gamma rays, Surface properties, Surfaces, Crystal lattice defects, Iron compounds, Chlorides.

Identifiers: Lithium fluoride, Iron chlorides.

Double-spiral features have been observed at high resolution on lithium fluoride (100) surfaces etched in distilled water containing from 0.1 to 9 ppm ferric ions (as ferric chloride). The models proposed for similar features on other materials are reviewed and rejected in favour of a mechanism involving the formation of prismatic loops produced by vacancy condensation following gamma-irradiation. In preference to the existence of dislocations in lithium fluoride with large Burgers Vector, a series of 'stacked' loops is suggested. (Author)

LA-3471 **Field 20B, 20L**
CFSTI Prices: HC$2.00 MF$0.50
Los Alamos Scientific Lab., Univ. of California, N. Mex.
DYNAMICS OF DISORDERED HARMONIC LATTICES IN ONE, TWO, AND THREE DIMENSIONS,
by Daniel N. Payton III, and William M. Visscher. 27 Jan 66, 22p
Contract W-7405-eng-36

Descriptors: (*Crystal lattices, Numerical methods + procedures), (*Metallic crystals, Crystal lattice defects).

For abstract, see T 66 15.

RFP-643 **Field 20B, 7D**
CFSTI Prices: HC$3.00 MF$0.50
Rocky Flats Div., Dow Chemical Co., Golden, Colo.
LOW-ENERGY ELECTRON DIFFRACTION STUDY OF THE (100) PLANE OF A TUNGSTEN SINGLE CRYSTAL,
by R. O. Adams. 4 Apr 66, 48p
Contract AT (29-1)-1106

Descriptors: (*Electron diffraction analysis, Single crystals), (*Single crystals, Tungsten).

For abstract, see N 20 13.

AD-442 555 **See Field 20E**

AD-634 128 **See Field 11F**

AD-634 392 **See Field 13H**

AD-634 591 **See Field 20L**

AD-634 645 **See Field 20L**

ORNL-3913 See Field 7E

PB-169 081 See Field 20K

TID-22221 See Field 7A

20C. ELECTRICITY AND MAGNETISM

AD-419 846 Field 20C, 18I, 20L, 7D K
CFSTI Price: HC$5.60
Notre Dame Univ., Ind.
THE DESORPTION AND MIGRATION OF STRONTIUM ON TUNGSTEN USING PULSED FIELD EMISSION MICROSCOPY.
Technical rept.,
by T. Madey, A. Petrauskas, and E. Coomes.
1963, 52p
Contract Nonr-1623 (01)
Proj. NR-372-731
Presented at the Field Emission Symposium (10th) Cleveland, Ohio 4-6 September 1963.

Descriptors: (*Strontium, Sorption), (*Tungsten, Metac coatings), (*Field emission, Microscopy), Thermionic emission, Electron microscopy, Diffusion, Work functions, Heat of activation, Monomolecular films, Crystal structure, Transport properties.

Identifiers: Desorption, Field electron microscopy.

The field electron microscope was used to determine the activation energy for the desorption of Sr from W as a function of Sr coverage. The migration of Sr on W for both heavy and light coverages of Sr was also investigated. (Author)

AD-422 444 Field 20C
CFSTI Price: HC$5.60
Lincoln Lab., Mass. Inst. of Tech., Lexington.
PROPERTIES OF DIELECTRICS FROM REFLECTION COEFFICIENTS IN ONE DIMENSION,
by H. E. Moses, and C. M. deRidder. 11 Jul 63, 51p Technical rept. no. TR-322
Contract AF 19 (628)-500, ARPA order-13

Descriptors: (*Dielectrics, Numerical analysis), Dielectric properties, Electromagnetism, Propagation, Scattering, Partial differential equations, Differential equations, Boundary value problems, Real variables, Functions, Integration, Wave transmission, Integral equations.

Mathematical techniques are given for calculating dielectrics which give rise to prescribed reflection coefficients in certain problems of one-dimensional electromagnetic propagation. The techniques are, in principle at least, exact. They are based on the use of an equation of the Gel'fand-Levitan type for the one-dimensional Schrodinger equation. Although no practical applications are given, it is hoped that this report will encourage the use of newer techniques in synthesis problems. (Author)

AD-634 185 Field 20C, 20F
CFSTI Prices: HC$3.00 MF$0.75
Polytechnic Inst. of Brooklyn, N. Y. Microwave Research Inst.
MODEL ANALYSIS AND SYNTHESIS OF ELECTROMAGNETIC FIELDS.
Research rept.,
by Leopold P. Felsen, and Nathan Marcuvitz.29 Dec 65, 81p PIBMRI-1307-65
Contract AF 19 (628)-4324
Proj. AF-4600
Task 460004
AFCRL-66-176

Descriptors: (*Electromagnetic fields, Synthesis), (*Transmission lines, Equations), Spheres, Diffraction, Green's function, Boundary value problems, Waveguides.

Identifiers: Modal analysis.

Electromagnetic radiation and diffraction problems in regions characterized simply in a spherical coordinate system are analyzed from a spherical transmission line viewpoint. The electromagnetic fields are decomposed into E mode and H mode constituents with respect to the radial coordinate, and these separate contributions may in turn be derived from scalar potentials functions, which satisfy the scalar wave equation. Alternative representations for the potentials in terms of transmission along the angular coordinates are presented and their respective virtues discussed. The results are applied to various electromagnetic boundary value problems involving spherical, conical, and wedge-shaped obstacles, and high-frequency asymptotic solutions are derived which permit an interpretation of the field in quasi-optical terms. (Author)

AD-634 516 Field 20C, 9E
CFSTI Prices: HC$1.00 MF$0.50
Institute of Modern Languages, Inc., Washington, D. C.
CONTROL OF THE CURRENT OF A SHORT-CIRCUITED SUPERCONDUCTIVE NETWORK,
by V. P. Karzev. Jun 66, 8p
Contract DA-44-009-AMC-1563 (T)
Proj. DA-1C622001A012
AERDL-T-1848-66, TT-66-61534
Upravlenie Tokom Korotko-Samknutoyi Sverkhprovodiaschei Zepi, trans. of Elektrotekhnika (USSR) n1 p58-9 1966.

Descriptors: (*Electrical networks, *Superconductivity), (*Current regulators, Superconductivity), Leakage (Electrical), Superconductors, Magnets, Electromagnetism, Generators, USSR.

A twelve-pole unipolar static generator with a superconductive shield which permits operation at industrial frequency without a 'spot-delay effect' is discussed.

AD-634 740 Field 20C, 9C
CFSTI Prices: HC$4.00 MF$0.75
Air Force Weapons Lab., Kirtland AFB, N. Mex.
CURRENTS INDUCED IN CABLES IN THE EARTH BY A CONTINUOUS-WAVE ELECTROMAGNETIC FIELD.
Rept. for Jan 64-Jun 65,
by Donald R. Marston, and William R. Graham.-May 66, 112p AFWL-TR-65-94
Proj. AF-5710
Task 571004

Descriptors: (*Electromagnetism, *Transmission lines), Underground, Electric cables, Electromagnetic fields, Inductance, Electric currents, Ground (Electrical).

The problem under examination is the determination of the currents induced by a distributed continuous-wave electromagnetic field in a conducting wire buried in the earth. Transmission line theory is shown to provide a suitable approximation for studying this problem. A program for machine computation, utilizing this theory, was written to calculate the induced current. The special cases examined are: a bare wire with open circuit terminations, an insulated wire with either open circuit terminations or grounded terminations, and a wire encased in a high-conductivity coating with open circuit terminations. The theoretical calculations are compared with experimental results obtained by Stanford Research Institute. The comparison of the theoretical and experimental results indicates that predictions of practical value can be made by using the transmission-line model. (Author)

AD-634 758 Field 20C, 20A, 20N
CFSTI Prices: HC$4.00 MF$0.75
Defense Research Lab., Univ. of Texas, Austin.
DIFFRACTION OF A PLANE WAVE BY A PARABOLOID OF REVOLUTION.
Doctoral thesis,
by F. C. Karal. Oct 50, 113p Bumblebee-139
Contract NOrd-9195

Descriptors: (*Sound, Scattering), (*Electromagnetic waves, *Diffraction), Bodies of revolution, Reflection, Dielectrics, Mathematical analysis.

Identifiers: Theses.

Diffraction problems involving periodic plane waves incident upon a material body have been treated in detail for a large variety of shapes. The paraboloid of revolution, however, has apparently been neglected in the literature. It is the purpose of the present thesis to carry out an investigation of this general problem. The specific problems considered are the diffraction of a plane sound wave by a paraboloid of revolution, the diffraction of an electromagnetic plane wave by a perfectly conducting paraboloid of revolution, and the diffraction of an electromagnetic plane wave by a dielectric paraboloid of revolution. The first and second problems are considered in some detail, but the third, due to complexity of the results, is carried only to the point where the boundary conditions can be found.

AD-421 573 See Field 20L

AD-634 129 See Field 9A

AD-634 130 See Field 9A

AD-634 246 See Field 20E

AD-634 247 See Field 20E

AD-634 248 See Field 20E

AD-634 297 See Field 20N

AD-634 477 See Field 10B

AD-634 521 See Field 20I

AD-634 627 See Field 20B

AD-634 725 See Field 20L

AD-634 761 See Field 9C

CONF-650922 See Field 20G

NBS-TN-327 See Field 20J

NBS-TN-328 See Field 20J

20D. FLUID MECHANICS

AD-634 146 Field 20D, 1C, 1A
CFSTI Prices: HC$2.00 MF$0.50
North American Aviation, Inc., Los Angeles, Calif.
LINEAR, ROTATIONAL FLOW OVER THE WINDWARD SIDE OF A HYPERSONIC DELTA WING.
Interim rept.,
by Norman D. Malmuth. 1966, 38p NA-66-495
Contract AF 49 (638)-1477
Proj. AF-9781
Task 978101
AFOSR-66-0650

Descriptors: (*Delta wings, *Hypersonic flow), (*Aerodynamics, Delta wings), Vortices, Perturbation theory, Fluid flow, Numerical analysis.

The hypersonic flow over the compression side of a delta wing is analyzed within the framework of Van Dyke's Small Disturbance Theory and the assumption that the vertex angle of the Mach cone bounding the central nonuniform interaction region is small in comparison to the wing apex angle. Asymptotic expansions of the flow quantities in terms of a small parameter equal to the ratio of the tangents of these angles are introduced. The leading terms in these expansions correspond to the

flow over a wedge of semivertex angle equal to the incidence of the delta wing, and the second order terms are linear rotational perturbations due to the three-dimensional interaction across the wing. By use of methods previously developed for other wedge-like hypersonic conefields, the lift, shock shape and pressure field over the wing are obtained. Perturbation and total quantites are compared with results from the numerical solution of Babaev giving good qualitative agreement for the former and satisfactory quantitative accord for the latter, within the assumptions of the theory. (Author)

AD-634 163 **Field 20D**
CFSTI Prices: HC$2.00 MF$0.50
Naval Weapons Lab., Dahlgren, Va.
DECAY OF A DISCONTINUITY LINE IN A VISCOUS FLUID.
Technical rept.,
by Hans J. Lugt. May 66, 45p NWL-2038
Task R360FR103/2101/R0110101

Descriptors: (*Fluids, Viscosity), (*Vortices, Numerical analysis), Boundary value problems, Laminar flow.

Integral transforms are used to solve singular initial value problems for Stokes' slow-motion equations. The method is applied to investigate the decaying process of straight and circular discontinuity lines as well as the dissipation of local disturbances in an infinite medium. A criterion for the occurrence of secondary vortices is derived. Numerical results are displayed for periodic initial disturbances which demonstrate graphically the spreading of the disturbance from a discontinuity line into the fluid under successive development and decay of secondary vortices. A more detailed sequence of dissipating vortices is evaluated numerically and displayed by streamline patterns in connection with Lamb's vortical eigenmotions in an infinitely long cylinder of finite radius. (Author)

AD-634 254 **Field 20D**
CFSTI Prices: HC$3.00 MF$0.75
Polytechnic Inst. of Brooklyn, N. Y. Dept. of Aerospace Engineering and Applied Mechanics.
AN EXPERIMENTAL INVESTIGATION OF THREE-DIMENSIONAL FREE MIXING IN INCOMPRESSIBLE, TURBULENT, FREE JETS.
Scientific rept.,
by Nicholas Trentacoste, and Pasquale M. Sforza. Mar 66, 76p PIBAL-871
Contract AF 49(638)-1623
Proj. AF-9781
Task 978101
AFOSR-66-0651

Descriptors: (*Jet mixing flow, Experimental data), Three-dimensional flow, Incompressible flow, Turbulence, Jets.

An experimental investigation of the bulk properties of turbulent, three-dimensional, incompressible, air jets issuing into a quiescent air ambient is presented. The jet orifices utilized included rectangular, elliptical, axisymmetric and triangular geometries. Experimental results of pertinent mean flow properties such as axis velocity decay, half-width growth, etc., are reported. The flow fields of such jets are found to be characterized by three distinct regions in the axis velocity decay. The results obtained lead to the conclusion that low-speed jets which originate from non-axisymmetric orifices decay to axisymmetry far downstream of the jet exit. (Author)

AD-634 261 **Field 20D**
CFSTI Prices: HC$2.00 MF$0.50
Boeing Scientific Research Labs., Seattle, Wash. Flight Sciences Lab.
THE EFFECT OF UPSTREAM VELOCITY PROFILE ON THE FREE MIXING OF JETS WITH AMBIENT FLUID,
by I. Wygnanski, and O. Hawaleshka. Apr 66, 29p D1-82-0528, Flight Sciences Lab-106
Also available from the authors.

Descriptors: (*Jet mixing flow, Velocity), Turbulence, Jets, Laminar flow, Two dimensional flow, Trailing edge.

The asymmetric-jet created by the mixing of a wall-jet with quiescent surrounding fluid downstream of a trailing edge is considered. The method of analytic continuation, developed by Goldstein is extended to provide a series solution for the asymmetric jet. The different boundary conditions as well as the extension to turbulent flow reveal some new aspects which are discussed in detail. In particular, the conservation of momentum downstream of the trailing edge enables one to determine the location of a jet with respect to the y-coordinate. In turbulent flow the analysis has been supplemented by experiment, providing a fair agreement between the two. (Author)

AD-634 275 **Field 20D**
CFSTI Prices: HC$2.00 MF$0.50
Department of the Navy, Washington, D. C.
THE STRUCTURE OF A SHOCK WAVE, CONSIDERING IMPULSE AND ENERGY TRANSFER BY RADIATION,
by V. S. Imshennik, and Yu. I. Morozov. 1966, 27p Translation-2003
TT-66-61499
Trans. of Zhurnal Prikladnoi Mekhaniki i Tekhnicheskoi Fiziki (USSR) n2 1964.

Descriptors: (*Shock waves, Mathematical analysis), Equations of state, Energy, Thermal radiation, USSR.

For abstract, see T 66 15.

AD-634 282 **Field 20D**
CFSTI Prices: HC$3.00 MF$0.75
Defense Research Lab., Univ. of Texas, Austin.
PRESSURE DISTRIBUTIONS ON SINGLE AND TANDEM CYLINDERS MOUNTED ON A PLATE IN MACH NUMBER 5.0 FLOW.
Technical rept.,
by William H. Miller. 1 Jun 66, 80p DRL-538, CR-25
Contract NOrd-16498
Subcontracted to Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab. subcontract 181471, Task E.

Descriptors: (*Cylindrical bodies, Pressure), (*Hypersonic flow, Cylindrical bodies), Distribution, Flat plate models, Supersonic flow, Adiabatic gas flow, Two-dimensional flow, Shear stresses, Drag.

The distributions of pressures on short, circular cylinders mounted perpendicular to a flat surface and protruding into a supersonic air flow were determined. Schlieren photographs of the associated flow fields supplemented these data. Tests were conducted under adiabatic conditions with a free-stream Mach Number of 4.88 and a Reynolds Number of 576,000. Protuberance heights ranging from 0.23 to 6 times the local thickness of the turbulent boundary layer on the supporting surface were investigated. Upstream, shear-layer separation occurred. An oblique compression zone accompanied this separation and intersected the protuberance bow shock to form a lambda shock. High values of pressure recovery and sectional drag were indicative of this region of shock interaction. The model pressure loading in certain tandem configurations was found to exceed the corresponding local single-cylinder values. Form-drag coefficients, determined by graphical integration of the pressure data, correlated well with total drag coefficients reported in the literature. (Author)

AD-634 288 **Field 20D**
CFSTI Prices: HC$2.00 MF$0.50
California Univ., Berkeley. Coll. of Engineering.
EXPERIMENTAL INVESTIGATION OF THE INITIATION OF DETONATION BEHIND A REFLECTED SHOCK WAVE.
Technical note,
by Thomas J. Krusic. Jan 66, 39p TN-1, AS-66-2
Grant AF-AFOSR-129-66
AFOSR-66-0940

Descriptors: (*Shock waves, *Detonation waves), Experimental data, Shock tubes.

The purpose of this work was to develop an experimental apparatus for the study of the initiation of detonation in a gaseous medium as a result of shock compression. The design of the apparatus is described, and results of some preliminary experiments are reported. They indicate that the mechanism of the initiation process behind reflected waves in a shock tube is essentially different than that caused by an accelerating flame. (Author)

AD-634 293 **Field 20D**
CFSTI Prices: HC$2.00 MF$0.50
California Univ., Berkeley. Coll. of Engineering.
EXPERIMENTAL STUDY OF THE WAVE STRUCTURE OF MARGINAL DETONATION IN A RECTANGULAR TUBE.
Technical note,
by Gerald B. Steel. Jan 66, 44p TN-3, AS-66-4
Grant AF-AFOSR-129-66
AFOSR-66-0936

Descriptors: (*Shock waves, Detonation waves), Shock tubes, Experimental data.

Wave structure of marginal detonations, propagated through nitrogen-diluted stoichiometric hydrogen-oxygen mixtures in a 1-3/4 in. by 3/4 in. rectangular tube, is studied by the soot technique and velocity probes. Both weak shocks and strong detonations are shown to propagate transversely behind the detonation front. In marginal detonations in rectangular tubes, waves propagate in both lateral directions behind the initial shock. Ordinarily, each wave is the weak reflected shock of a triple shock interaction. Occasionally, however, as the result of a complex shock interaction, a transverse detonation is developed behind the leading shock. This produces a trace in the form of a band on a tube wall that has been previously coated with carbon soot. The width of this band is governed by the induction delay behind the initial shock. By coupling its measurement with velocity data, induction times and temperatures are obtained from self-sustained detonations. (Author)

AD-634 302 **Field 20D**
CFSTI Prices: HC$1.00 MF$0.50
Redstone Scientific Information Center, Redstone Arsenal, Ala.
SPECTRUM OF PRESSURE FLUCTUATIONS IN A TURBULENT FLOW,
by E. A. Novikov. 4 May 66, 6p RSIC-547
TT-66-61505
Trans. of Akademiya Nauk SSSR. Izvestiya. Fizika Atmosfery i Okeana, v1 p992-3 1965.

Descriptors: (*Pressure, *Turbulence), Statistical analysis, Fluid flow.

Calculation of the pressure spectrum in a turbulent flow, assuming the flow to be generated by a random intermittent function. The spectrum obtained on the basis of this assumption is found to differ greatly from a spectrum obtained previously on the basis of Millionshchikov's Hypothesis of Quasi-Normality. (Author)

AD-634 319 **Field 20D, 13J**
CFSTI Prices: HC$2.00 MF$0.50
David Taylor Model Basin, Washington, D. C. Hydromechanics Lab.
CAVITATION INCEPTION ON THREE-DIMENSIONAL ROUGHNESS ELEMENTS.
Research and development rept.,
by Bruce W. Benson. May 66, 36p Rept. no. 2104
Proj. S-F013-02-04
Task 1712

Descriptors: (*Cavitation, *Hydrodynamic configurations), Roughness, Boundary layer.

Identifiers: Cavitation inception.

Cavitation inception velocities have been measured for the flow over three-dimensional roughness elements, embedded in a boundary layer on a flat plate, in the 36-inch water tunnel at the David Taylor Model Basin. The roughness elements considered are right circular cylinders, cones, and hemispheres whose heights vary from one-thirty-second to three-forths of an inch. Cavitation inception number, based on tunnel velocity, is plotted as a function of the ratio of roughness height to boundary layer thickness. This resulted in separate curves for each test velocity. When, however, the cavitation number was computed on the basis of the velocity within the boundary layer at the tip of the roughness, the cavitation number was found to be primarily a function of the local Reynolds number, based on roughness height and local velocity. Of the three roughness geometries, the cylinders produced the largest cavitation numbers; the hemispheres, the smallest. (Author)

AD-634 330 **Field 20D, 13J**
CFSTI Prices: HC$2.00 MF$0.50
California Univ., Berkeley. College of Engineering.
AN EXPERIMENTAL STUDY OF SHIP RESISTANCE AND MOTIONS IN WAVES -- A TEST FOR LINEAR SUPERPOSITION.
Technical rept.,
by O. J. Sibul. Jan 66, 28p NA-66-3
Contract Nonr-3656 (16)
Proj. S-R-009-01-01

Descriptors: (*Hydrodynamics, *Ships), Experimental data, Motion, Physical properties.

Identifiers: Seaworthiness.

A series of experiments were performed to check the linear superposition of resistance of component waves on a composite wave. A wave train, having only two components of uniform waves, was generated. The resistance in each of the wave components was measured and the linear superposition of this data compared with measurements in the composite wave. The results indicate that the linear superposition underestimates the resistance in the composite wave. The degree of underestimation depends upon the severity of the ship motions. With slamming and with green water on the deck, the predicted resistance, based on linear superposition, was considerably less than the actual measurement. For moderate waves and smooth motions the difference was smaller. (Author)

AD-634 373 **Field 20D**
McGill Univ., Montreal (Quebec). Mechanical Engineering Research Labs.
THE EFFECT OF JET ENTRAINMENT ON LOSS OF THRUST FOR A TWO-DIMENSIONAL SYMMETRICAL JET-FLAP AEROFOIL,
by I. Wygananski. Feb 65, 23p
Grant DRB-9551-12

Descriptors: (*Jet flaps, Thrust), (*Thrust, Airfoils), Jets, Mass transfer, Two-dimensional flow, Reduction, Canada, Drag, Incompressible flow.

Identifiers: Jet entrainment.

Jet drag, defined as the form drag associated with jet entrainment in otherwise inviscid fluid, was analysed by replacing a two-dimensional incompressible jet with a suitable continuous distribution of sinks. Exact solutions for the jet drag, with the flow incompressible and the jet turbulent, are presented for uncambered struts of various shapes (including an ellipse and a circular cylinder), various thickness ratios, and with blowing slots of various widths in both quiescent and uniform streaming flow. In uniform streaming flow the jet is blowing in the direction of the external flow. The extension of the theory to cross-stream blowing (as in the jet flap) is discussed. The theory compares favourably with the few available experimental results when the ratio of jet velocity to streaming-flow velocity is sufficiently large. (Author)

AD-634 387 **Field 20D, 21E, 21G**
CFSTI Prices: HC$2.00 MF$0.50
Boeing Co., Wichita, Kans. Airplane Div.
FOREIGN OBJECT INGESTION PREDICTION FOR ENGINE INLETS BY TRAJECTORY ANALYSIS IN A POTENTIAL FLOW FIELD.
Final rept.,
by Dale W. Brees, and William F. Schmidt. 29 Dec 65, 47p D3-6961-2
Contract NOw-65-0273-f

Descriptors: (*Ingestion (Engines), Mathematical prediction), (*Engine air systems components, Water impingement), Programming (Computers), Particle size, Drops, Axially symmetric flow.

An investigation was made of the application of a water droplet trajectory computer program to the prediction of foreign object ingestion of engine inlets. Variations of particle size, weight and initial conditions on particle trajectories were investigated for a stationary and a moving engine inlet potential flow field. A surface-particle resilience factor used with an added solid particle ricochet routine was also evaluated. The computed results provide an adequate solution for plane flow fields or the vertical centerline plane of an axially-symmetric flow field. (Author)

AD-634 396 **Field 20D, 21E, 21G**
CFSTI Prices: HC$6.00 MF$1.50
Boeing Co., Wichita, Kans.
WATER DROPLET IMPINGEMENT PREDICTION FOR ENGINE INLETS BY TRAJECTORY ANALYSIS IN A POTENTIAL FLOW FIELD, SAMPLE PROBLEM.
Final rept.,
by William F. Schmidt. 29 Dec 65, 289p D3-6961-1
Contract NOw-65-0273-f

Descriptors: (*Water impingement, Mathematical prediction), (*Engine air systems components, Water impingement), Trajectories, Programming (Computers), Potential theory, Supersonic flow, Axially symmetric flow.

The report was written to provide a sample problem to be used to guide the user of the water droplet impingement prediction computer program. The report is intended to illustrate the preparation of input data and the interpretation of results.

AD-634 404 **Field 20D, 21E, 21G**
CFSTI Prices: HC$6.00 MF$1.25
Boeing Co., Wichita, Kans. Airplane Div.
WATER DROPLET IMPINGEMENT PREDICTION FOR ENGINE INLETS BY TRAJECTORY ANALYSIS IN A POTENTIAL FLOW FIELD.
Final rept.,
by William F. Schmidt. 29 Dec 65, 227p D3-6961
Contract NOw-65-0273-f

Descriptors: (*Engine air systems components, Water impingement), (*Water impingement, Programming (Computers)), Trajectories, De-icing, Drops, Incompressible flow, Mathematical prediction.

A digital computer program was developed to predict the anti-icing requirements of engine inlets by calculating water droplet trajectories toward the particular inlet through a potential flow field. The incompressible potential flow field is determined by a separate computer program using known boundary conditions. The potential flow field results are combined with the droplet and flow physical data for input to a droplet trajectory computer program. This water droplet trajectory program is based on balancing the drag, buoyancy and weight forces on the water droplet with the rate of change of the water droplet momentum. The water droplet computer program is extremely versatile because the actual design shape is used in the study and therefore the results do not need to be extrapolated. (Author)

AD-634 529 **Field 20D**
CFSTI Prices: HC$2.00 MF$0.50
Brown Univ., Providence, R. I. Div of Applied Mathematics.
A CRITICAL SURVEY OF LITERATURE CONCERNING THE TOMS' EFFECT.
Technical rept.,
by Cipher Alston Deavours. May 66, 42p TR-1
Contract Nonr-562 (42)
Proj. NR-062-179

Descriptors: (*Polymers, Fluid flow), Concentration (Chemistry), Solvates, Solutions, Viscoelasticity.

Identifiers: Toms' effect, Non-Newtonian fluids.

Literature on the Toms' effect, i.e., greatly increased flow rate of dilute polymer solutions occurring with small increases in solute concentration, is examined. Several existing theories dealing with the phenomena are reviewed, appraised and modified. Work from related fields is analyzed for its applicability to the situation and an effort is made to suggest future lines of study. (Author)

AD-634 631 **Field 20D, 19D**
CFSTI Prices: HC$1.00 MF$0.50
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
WATER SHOCK WAVES FROM ABOVE-WATER EXPLOSIONS,
by J. M. Pinkston Jr, and Akira Sakurai. Jun 66, 15p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14177 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Airburst, Shock waves), (*Shock waves, Underwater), (*Acoustics, Underwater), Explosion effects, Fluid mechanics.

When an explosion occurs in the atmosphere above a water surface, most of the energy in the resulting shock wave will be reflected upon striking the air-water interface; however, some portion of the energy will be transmitted through the interface and propagate into the water. The experimental study, designed to provide quantitative information on the induced water shock as well as verigy theoretical findings, was conducted in a trapezoidal-shaped test basin 250 ft long, 150 ft wide (midpoint), and 20 ft deep. It involved the detonation of some sixty 21-lb spheres of TNT positioned at various distances above the water surface, and pressure-time histories of the induced water shocks were measured at spatial positions underwater for depths ranging from just beneath the surface to middepth. (Author)

AD-634 671 **Field 20D, 21E**
CFSTI Prices: HC$1.00 MF$0.50
Army Tank-Automotive Center, Warren, Mich.
DEPOSITION OF PARTICLES IN A TURBULENT SLOT FLOW,
by Herbert H. Dobbs, and John W. Wiss. Jun 66, 14p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete Proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one unclassified volume available to qualified DDC users.

Descriptors: (*Aerodynamic slots, Particles), (*Dust, Deposition), Turbulence, Air pollution, Contamination, Aerosols, Density, Gas

filters, Flow visualization, Instrumentation, Digital computers.

The change in concentration in the direction of flow is of primary concern in the paper.

AD-634 713 **Field 20D, 12A**
Aerospace Research Labs., Office of Aerospace Research, Wright-Patterson AFB Ohio.
COMPARISON OF CLOSURE APPROXIMATION THEORIES IN TURBULENT MIXING,
by Jon Lee. 7 Jun 65, 15p ARL-66-0081

Descriptors: (*Jet mixing flow, *Turbulence), Approximation (Mathematics), Statistical analysis, Theory.

Using various closure approximation theories, the evolution of scalar quantity spectrum in a statistically stationary isotropic turbulent velocity field is investigated to provide a unified comparison at Peclet number of 50. The phenomenological Heisenberg (eddy diffusivity) transfer function and the analytical approaches including the truncation, the quasi-normal, and the recent direct-interaction closure approximations are examined. As already known, the truncation and quasi-normal closures result in a negative-spectrum within short decay times. A modified quasi-normal closure formula is suggested as a means of approximating the simultaneous covariances, and the results thereof are comparable with the direct-interaction counterparts. (Author)

AD-634 722 **Field 20D**
CFSTI Prices: HC$3.00 MF$0.75
Dynasciences Corp., Fort Washington, Pa.
CHARTS FOR ESTIMATING AERODYNAMIC FORCES ON STOL AIRCRAFT WINGS IMMERSED IN PROPELLER SLIPSTREAMS.
Final rept.,
by K. P. Huang, L. Goland, and I. Balin. Nov 65, 81p DCR-161
Contract NOw-64-0316-f

Descriptors: (*Short take-off planes, Aerodynamics), (*Wings, Aerodynamic characteristics), Mathematical prediction, Propellers (Aerial), Force (Mechanics), Lift.

Identifiers: Slipstream.

Equations and charts are presented for estimating the lift and longitudinal force coefficients of STOL aircraft wings immersed in propeller slipstreams. Sample calculations are made and the results show fair to good correlation with available experimental data. The effect of many design and operating parameters is analyzed. (Author)

AD-634 736 **Field 20D, 1A**
CFSTI Prices: HC$3.00 MF$0.50
David Taylor Model Basin, Washington, D. C. Aerodynamics Lab.
EFFECT OF FOREBODY MODIFICATIONS ON THE AERODYNAMIC CHARACTERISTICS OF A SIMULATED AIRCRAFT STORE AT MACH NUMBERS FROM 0.50 TO 1.17.
Research and development rept.,
by F. E. West Jr, and H. Dulany Davidson Jr.
Mar 66, 58p Aero-1103
DTMB-2175

Descriptors: (*Aerodynamics, *External stores), (*Blunt bodies, Aerodynamic characteristics), Aircraft protuberances, Guided missile launchers, Jettisonable equipment, Wind tunnel models, Subsonic characteristics, Supersonic characteristics.

An exploratory investigation was made of the effects of various forebody modifications on the logitudinal aerodynamic characteristics of a simulated low-drag aircraft store. Results were obtained at Mach numbers from 0.50 to 1.17 and angles of attack up to about 21 degrees. Specifically, the effects of progressively sliding a cylindrical sleeve forward over the store forebody, eliminating the store forebody for various sleeve projections, and of disk spoilers on the forbody were explored. The results show that the static stability characteristics of the store were improved by modifications which induced flow separation at some position on the store forebody. The extent of the Mach number and angle-of-attack ranges where improvements occurred was a function of both the modification and store center-of-gravity position (which may shift with changes in the forebody). (Author)

AD-634 743 **Field 20D, 20A**
CFSTI Prices: HC$5.00 MF$1.00
Rochester Univ., N. Y. Acoustical Physics Lab.
DYNAMICS OF A TRANSLATING CAVITY IN A LIQUID,
by Anthony Eller. 31 May 66, 173p
Contract Nonr-668 (18)

Descriptors: (*Acoustics, Cavitation), (*Cavitation, Dynamics), Liquids, Motion, Analysis, Oscillation, Incompressible flow, Bubbles, Drag.

A strong sound field in a liquid may generate small cavities that move rapidly through the liquid. The study is an analysis of the dynamics of a cavity in translational motion. A principal conclusion is that translating cavities have a stable size and shape for a wide range of conditions. It is also found that the presence of translational motion contributes an outward dynamic pressure that tends to enlarge the cavity. As a result, the equilibrium radius of a translating cavity is greater than the equilibrium radius of the same cavity at rest. The analysis is divided into two parts. The first part is a study of the equilibrium size and shape, stability, and modes of oscillation of a translating cavity in an infinite, incompressible and inviscid liquid. In the second part an approximate model is introduced in order to study the radial motion without the complexities due to the time dependence of the cavity shape. (Author)

LA-3425 **Field 20D, 9B**
CFSTI Prices: HC$4.00 MF$1.00
Los Alamos Scientific Lab., Univ. of California, N. Mex.
THE MAC METHOD - A COMPUTING TECHNIQUE FOR SOLVING VISCOUS, INCOMPRESSIBLE, TRANSIENT FLUID-FLOW PROBLEMS INVOLVING FREE SURFACES,
by J. Eddie Welch, Francis H. Harlow, John P. Shannon, and Bart J. Daily. Nov 65, 144p
Contract W-7405-eng-36

Descriptors: (*Incompressible flow, Viscosity), (*Fluid flow, Digital computers).

For abstract, see T 66 15.

PB-169 457 **Field 20D, 1A**
CFSTI Prices: HC$2.60 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
AN EXPLORATORY INVESTIGATION INTO THE DEFLECTION OF THICK JETS BY THE COANDA EFFECT,
by L. J. S. Bradbury, and M. N. Wood. Oct 65, 22p Technical rept. no. TR-65235

Descriptors: (*Coanda effect, Deflection), (*Jets, Deflection), Thickness, Nozzles, Boundary layer control.

Measurements were made of the maximum deflection from the Coanda effect of a plane jet by a deflecting surface comprising a circular drum whose diameter was four times the jet nozzle width and which had a small flap attached to it. It was shown that the deflection of this comparatively thick jet is dependent on the jet pressure ratio and only quite small deflections can apparently be obtained for pressure ratios greater than 2. A few tests with a jet of slightly reduced thickness showed that although larger deflections were obtained at low pressures, only small deflections were again possible at pressure ratios greater than 2. Finally, some attempts at boundary layer control with spanwise auxiliary blowing slots on the deflecting surface indicated that some increase in deflection angles may thereby be achieved. (Author)

PB-170 406 **Field 20D, 20M**
CFSTI Prices: HC$17.80 MF$1.00
Jet Propulsion Center, Purdue Univ., Lafayette, Ind.
MASS TRANSFER IN ANNULAR, TWO-PHASE FLOW.
Final rept.,
by G. R. Schneiter. Feb 66, 184p F-66-2, JPC-419
Grants NSF-G-21976, NsG-592

Descriptors: (*Evaporation, Two-phase flow), (*Two-phase flow, Mass transfer), (*Mass transfer, Two-phase flow), Pipes, Air, Water, Heat transfer, Surface properties, Measurement.

The report discusses an experimental investigation of the mass transfer (evaporation) occurring during the annular, two-phase flow of air and water in a vertical pipe. Measurements are made of the mass transfer (evaporation) occurring during the annular, two-phase flow of air and water in a vertical pipe. Measurements were made of the mass transfer rate and the surface characteristics of the air-water interface as a function of the following flow parameters: water Reynolds number (23 to 1350), air inlet temperature (110 to 350F), and test section length (8 to 40 in.). All experiments were conducted at an air velocity of 48 fps in 1.5 in. I. D. glass test sections. The mass transfer rate was determined by measuring the increase in the specific humidity of the air stream as it passed through the test section. The surface characteristics (liquid film thickness, wave velocity, and surface area) were measured employing a light absorption technique. The mass transfer data were correlated satisfactorily by the equations for the local heat and mass transfer. (Author)

STL-372-14 (I) **Field 20D, 20M, 18I**
CFSTI Prices: HC$5.00 MF$1.00
TRW Systems, Redondo Beach, Calif.
HYDRODYNAMIC STABILITY OF NATURAL CIRCULATION BOILING SYSTEMS. VOLUME I. A COMPARATIVE SYSTEM OF ANALYTICAL MODELS AND EXPERIMENTAL DATA,
by L. G. Neal, and S. M. Zivi. 30 Jun 65, 190p
Contract AT (04-3)-372

Descriptors: (*Hydrodynamics, Stability), (*Boiling water reactors, Hydrodynamics).

AD-455 149 **See Field 14B**
AD-469 052 **See Field 21B**
AD-477 649 **See Field 14B**
AD-634 228 **See Field 7D**
AD-634 232 **See Field 20M**
AD-634 273 **See Field 22C**
AD-634 509 **See Field 14B**
AD-634 521 **See Field 20I**
AD-634 562 **See Field 1A**
AD-634 588 **See Field 20M**
AD-634 600 **See Field 22C**
AD-634 630 **See Field 20K**
AD-634 644 **See Field 20A**
AD-634 649 **See Field 19D**
AD-634 662 **See Field 16D**

AD-634 730 See Field 13J

AD-634 731 See Field 13J

AD-634 767 See Field 20I

LA-3407 See Field 9B

LA-3418 See Field 18I

LA-3426 See Field 20M

LA-3455 See Field 9B

RFP-691 See Field 18J

SC-DC-65-1907 See Field 1A

UCRL-14431 See Field 18C

20E. MASERS AND LASERS

AD-442 555 Field 20E, 20B
CFSTI Price: HC$3.60
Linde Div., Union Carbide Corp., Indianapolis, Ind.
SYMMETRICAL LASER CRYSTALS.
Annual summary rept., 1 May 63-30 Apr 64,
by O. H. Nestor. 25 Jun 64, 33p
Contract Nonr-4131 (00), ARPA Order-306-62
Proj. NR-017-708

Descriptors: (*Lasers, Symmetry (Crystallography)), (*Crystal growth, Lasers), Synthesis, Ferroelectric crystals, Fluorescence, Impurities, Barium compounds, Zirconates, Strontium compounds, Titanates, Stannates, Samarium, Manganese, Refractory materials, Oxides, Single crystals.

The objective of this investigation are to grow cubic cm-size crystals of cubic perovskites activated with divalent or tetravalent dopant cations which will substitute directly without charge compensation and to determine the fluorescence characteristics of these materials. The perovskite of primary interest is BaZr03 and of next interest is SrTi03. Dopant ions of interest include di- and tetra-valent rare earths and tetravelent manganese. (Author)

AD-455 571 Field 20E
CFSTI Price: HC$5.60
North Carolina State Univ., Raleigh. School of Physical Sciences and Applied Mathematics.
NUCLEAR ENERGY DRIVEN LASER SYSTEMS.
Final rept.,
by William R. Davis, Marvin K. Moss, Charles R. Philbrick, Hayne Palmour, and R. Douglas McBrayer. Jun 64, 52p
Contract DA-01-009-AMC-39 (Z)

Descriptors: (*Lasers, Nuclear energy), (*Nuclear energy, Lasers), (*Gamma rays, Lasers), Ruby, Cobalt, Pumping (Optical), Energy, Color centers, Band spectrum, Crystal growth, Single crystals, Radiation damage.

Experimental results are reported which successfully demonstrate that a mechanism exists whereby nuclear energy may be advantageously employed in increasing the energy output of ruby laser systems. In a series of experiments ruby laser crystals were irradiated with judiciously chosen dosages of Co60 gamma rays. Using a conventional pulsed system to pump the irradiated laser crystals, the energy output was found to be significantly increased with no increase in the energy input. Studies of radiation produced center formations in crystals (an energy storing process) and the related spectral absorption bands are discussed in some detail in an attempt to correlate the observations with presently known phenomena. Also, various developments made during the past year in growing and finishing laser crystals are reported. (Author)

AD-470 360 Field 20E
CFSTI Prices: HC$4.60 MF$0.50
Michigan Univ., Ann Arbor. Inst. of Science and Technology.
PREPARATION AND PROPERTIES OF POTENTIAL GREEN LASER MATERIALS CONTAINING HEXAVALENT URANIUM,
by Ojars Risgin. Sep 65, 46p Rept. nos. 6400-16-T, 4563-95-T
Contracts DA-28-043-AMC-00013 (E), AF 33 (616)-8365
Projs. DA-1P6-20801-A-186, MICHIGAN

Descriptors: (*Lasers, Materials), (*Uranium, Lasers), Uranyl ions, Halides, Nitrates, Acetates, Sulfates, Crystal growth, Mechanical properties, Lithium compounds, Sodium compounds, Line spectrum, Luminescence, Atomic energy levels, Data processing systems, Optical equipment components, Colors.

Since the uranyl ion appeared to be suitable as the basis for laser material oscillating in the green region of the spectrum, attempts were made to produce a crystalline laser material incorporating the uranyl ion. When attempts were made to grow crystals of a number of pure uranyl compounds, only a few could be produced as large, optically perfect single crystals, and these proved insufficiently resistant to mechanical and thermal shock to be practical-laser materials. Uranium-activated lithium and sodium fluorides were investigated and found to be potentially suitable. A detailed spectroscopic study was made of the energy levels of the uranium activator, and the luminescent center identified as the ion UO2F4 (2-). An assignment of the lines in uranium-activated lithium fluoride showed that the energy level system was suitable for four-level laser oscillation. When samples of the uranium-activated fluorides were fabricated and tested in Fabry-Perot resonators, no laser oscillation was observed. However, the fluorescence appeared to show a short period of stimulated emission, followed by an anomalously long period of decreased intensity caused by depopulation of the metastable level by upward transitions. (Author)

AD-470 376 Field 20E, 20F, 20L
CFSTI Prices: HC$3.60 MF$0.50
Michigan Univ., Ann Arbor. Inst. of Science and Technology.
SEMICONDUCTOR LIGHT SOURCES,
by Alfred E. Attard. Sep 65, 33p Rept. no. 6400-42-T
Contract DA-28-043-AMC-00013 (E)
Projs. DA-1P6-20801-A-186, MICHIGAN

Descriptors: (*Lasers, Diodes (Semiconductor)), (*Diodes (Semiconductor), Lasers), Gallium alloys, Arsenic alloys, Injection, Electroluminescence, Frequency modulation, High frequency, Photographic recording systems, Zinc, Hall effect, Instrumentation, Silicon, Modulation, Diffusion, Ruby.

Identifiers: Michigan project.

The development of semiconductor light sources and the applications of such sources were the objectives of this project. Some 250 GaAs diodes were prepared, most of these exhibited injection electroluminescence, and a few appeared to be capable of producing coherent radiation. Modulation of the light output at frequencies up to 10 Mc/s has been achieved. Study of these semiconductor light sources for photographic recording of data at high information rates was undertaken. Recordable data at frequencies up to 350 Kc/sec have been demonstrated with possibilities of extending this capability into the megacycle range. Multielement light sources have been fabricated to demonstrate the possiblity of simultaneous multichannel recording of data. (Author)

AD-634 161 Field 20E, 20I
CFSTI Prices: HC$1.00 MF$0.50
Department of the Navy, Washington, D. C.
DETECTION OF THE RAPID HALATION OF PHOTOIONIZATION AND THE CLOUD OF CONCENTRATED LONG-LIFE IONIZATION RESULTING FROM THE SHOCK WAVE OF A SPARK IN A LASER BEAM,
by G. A. Askaryan, M. S. Rabinovich, M. M. Savchenko, and A. D. Smirnova. 1966, 4p
Translation-2145
TT-66-61469
Obnaryzhenie Bystrogo Oreolo Fotoionizatsii i Oblaka Kontsentrirovannoi Dolgozhivuschei Ionizatsii ot Udarnoi Volny Iskry v Luche Lazera, trans. of Zhurnal Eksperimentalnoi i Teoreticheskoi Fiziki (USSR) v1 n6 p18-23 1965.

Descriptors: (*Lasers, Gas ionization), (*Shock waves, Lasers), (*Gas ionization, Lasers), Sparks, Photolysis, Photons, Light, Scattering, USSR.

Identifiers: Halation.

For abstract, see T 66 15.

AD-634 231 Field 20E
CFSTI Prices: HC$1.00 MF$0.50
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
CONSIDERATION OF THE SPLITTING OF THE METASTABLE LEVEL OF A THREE-LEVEL QUANTUM GENERATOR,
by B. I. Stepanov, and V. P. Gribkovskii. 14 Mar 66, 11p TG-230-T-467
Contract NOw-62-0604-c
TT-66-61474
Trans. of Akademiya Navuk BSSR, Minsk. Doklady, v7 n5 p305-8 1963.

Descriptors: (*Lasers, *Atomic energy levels), Ruby, Electron transitions, Probability, Distribution functions, Oscillation, USSR.

Previous theoretical studies of a three-level laser have not taken into account the fact that in real materials the metastable level is split. A more rigorous treatment is presented here, considering the ruby laser as a four-level system and using the transition probabilities and particle distribution functions to derive the conditions for steady-state oscillation. Factors favoring transition from one or the other of the two metastable sub-levels to the ground state are examined in detail, and the requirements for establishing oscillation separately at either of the two levels are obtained. If the probabilities of particle redistribution between the components of the metastable level are small as compared to the probabilities of descent of excited particles into the metastable state, then simultaneous oscillation at both frequencies is possible. (Author)

AD-634 245 Field 20E
CFSTI Prices: HC$1.00 MF$0.50
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
DISTRIBUTION OF PUMPING RADIATION DENSITY IN A TRIHEDRAL ROD,
by F. K. Rutkovskii, and T. K. Guryanova. 20 May 66, 7p TG-230-T476
Contract NOw-62-0604-c
TT-66-61490
Trans. of Akademiya Navuk BSSR, Minsk. Doklady, v9 n6 p364-6 1965.

Descriptors: (*Lasers, Pumping (Optical)), (*Pumping (Optical), Distribution), Prisms (Optics), Light, Density, Reflection, Energy, Rods, USSR.

The distribution of pump radiation density in a regular trihedral prism laser resonator is investigated by the methods of geometrical optics, using an expression derived previously for a rectangular prism. The problem of determining the path of a multiply reflected beam is set up geometrically for handling by a computer. Conditions under which the relative pumping density differs from zero are derived in terms of the Fresnel reflection coefficients of the rod, and are shown graphically as functions of reflectivity and location within the rod. The pumping density is uniformly distributed

for zero reflectivity and decreases toward the center of the rod for finite reflectivity. An expression is given for the ratio of energy absorbed in the rod to incident energy. (Author)

AD-634 246 **Field 20E, 9A, 20C**
CFSTI Prices: HC$1.00 MF$0.50
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
THEORY OF A CIRCULAR DIELECTRIC RESONATOR. II,
by A. M. Goncharenko, and B. A. Sotskii. 20 May 66, 9p TG-230-T475
Contract NOw-62-0604-c
TT-66-61491
Trans. of Akademiya Navuk BSSR, Minsk. Doklady, v9 n6 p360-3 1965.

Descriptors: (*Dielectrics, *Resonators), (*Masers, Resonators), (*Lasers, Resonators), Cylindrical bodies, Electromagnetism, Optics, USSR.

The behavior of a circular dielectric resonator under certain critical operating conditions is discussed. The general expressions for the performance and energy losses of a finite circular resonator which were derived in Part I (AD-634 248) of the article are applied to this case. It is concluded that only lower axial oscillations may occur at threshold pumping levels. At higher pumping levels nonaxial modes may also occur, resulting in a broadening of the beam. (Author)

AD-634 247 **Field 20E, 9A, 20C**
CFSTI Prices: HC$1.00 MF$0.50
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
THE RADIATION POWER OF GAS OPTICAL QUANTUM GENERATORS (LASERS) WITH PLANE MIRRORS AS A FUNCTION OF THE MIRROR MISALIGNMENT ANGLE,
by B. I. Stepanov, and A. P. Prishivalko. 20 May 66, 8p TG230-T474
Contract NOw-62-0604-c
TT-66-61492
Trans. of Akademiya Navuk BSSR, Minsk. Doklady, v9 n7 p432-4 1965.

Descriptors: (*Lasers, *Resonators), Optics, Mirrors, USSR.

Identifiers: Gas lasers.

The problem of field distribution and diffraction losses in resonators with tilted and curved mirrors is treated in the geometrical optics approximation, which has been shown to be valid for consideration of the integrated radiation power. A solution is given for resonators with non-reflecting lateral surfaces, which have properties similar to those of gas lasers. Losses through the lateral surfaces are shown to have a greater effect on the radiation power than diffraction losses. With absolutely plane end plates, the radiation power is extremely sensitive to very slight misalignment; in practice the sensitivity is much lower because of the less than perfect surface quality. The effect of surface quality is considered in terms of a set of concave areas oriented at random small angles and expressions are derived for the radiation power as a function of the surface quality. Agreement with experiment is satisfactory, making the method useful for approximate calculations, if diffraction losses are also considered. (Author)

AD-634 248 **Field 20E, 9A, 20C**
CFSTI Prices: HC$1.00 MF$0.50
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
THEORY OF A CIRCULAR DIELECTRIC RESONATOR. I,
by A. M. Goncharenko, and B. A. Sotskii. 20 May 66, 9p TG-230-T465
Contract NOw-62-0604-c
TT-66-61493
Trans. of Akademiya Navuk BSSR, Minsk. Doklady, v9 n4 p224-7 1965.

Descriptors: (*Dielectrics, *Resonators), (*Masers, Resonators), (*Lasers, Resonators), Cylindrical bodies, Electromagnetism, Optics, USSR.

The properties of a finite cylindrical dielectric resonator are discussed. The electromagnetic field of an infinite cylindrical resonator, both in the resonator and in the surrounding medium, is expressed in the form of cylindrical waves satisfying the boundary conditions. The electromagnetic field of a finite cylindrical resonator can be determined only inside the cylinder; the field is expressed as cylindrical waves traveling forward and backward along the cylinder axis. Attempts to use known functions to find the field in the surrounding medium are unsuccessful. But if the field inside the cylinder is known and the continuity of the normal energy flux components across the interface of the media is taken into account, the energy of individual natural oscillations, as well as the losses through the sides and ends of the cylinder, and the total energy stored in the cylinder, can be estimated. General formulas for these quantities have been derived. (Author)

AD-634 316 **Field 20E, 20N**
CFSTI Prices: HC$2.00 MF$0.50
TRW Systems, Redondo Beach, Calif. Quantum Physics Lab.
HIGH INTENSITY LASER PROPAGATION IN THE ATMOSPHERE.
Semiannual technical summary rept., 1 Nov 65-30 Apr 66,
by Saul Altshuler, Lee M. Frantz, and Theordore D. Holstein.27 May 66, 33p Rept. no. 4535-6003-R0000
Contract N00014-66-C0022, ARPA order-306

Descriptors: (*Atmosphere, Wave transmission), (*Lasers, Electromagnetic waves), Propagation, Transport properties, Absorption, Oxygen, Stability, Quantum mechanics.

Atmospheric heating by laser pulses in transmission windows has been investigated. Arguments are given for reducing previously given estimates for the absorption in the neighborhood of 10,468 A by nearly one order of magnitude. A study has been initiated of an additional heating mechanism not previously considered, namely collision-induced conversion of laser energy into energy of translational molecular motion. A discussion is given of a classical model and of extensions to a quantum mechanical description. (Author)

AD-634 507 **Field 20E, 14B**
CFSTI Prices: HC$1.00 MF$0.50
Harry Diamond Labs., Washington, D. C.
HIGH-CURRENT PULSE GENERATOR FOR GALLIUM ARSENIDE LASER,
by William L. Soper. Apr 66, 14p TM-66-3
Proj. DA-1A010501A015, HDL-36700

Descriptors: (*Pulse generators, *Pumping (Electronics)), (*Lasers, Pumping (Electronics)), (*Semiconductors, Lsers), Gallium alloys, Arsenic alloys, Diodes (Semiconductors), Mercury, Relays.

A mercury wetted relay pulse generator and a pulse transformer have been built to drive gallium arsenide lasers in a fast pulse mode. The system is capable of 100-amp subnanosecond rise-time pulses at 800-Hz repetition rates. The design and performance are discussed. (Author)

AD-634 655 **Field 20E, 19A**
CFSTI Prices: HC$1.00 MF$0.50
Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
CHEMICAL LASER PUMP,
by John L. Wright. Jun 66, 14p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Lasers, Pumping (Optical)), (*Pumping (Optical), Chemical reactions), (*Pyrotechnics, Pumping (Optical)), Mixtures, Cyanogen, Oxygen, Argon, Xenon, Helium, Metals, Detonations.

The sharply defined bright zone produced by the detonation of a cyanogen-oxygen mixture in small test vehicles looks promising as a pump for solid-state lasers such as neodymium-doped glass and ruby. Brightness temperatures between 6000 to 7000K are routinely obtained. By adding inert dopants such as argon, xenon and helium to the mixture, brightness temperatures in the vicinity of 8000K have been attained. The combustion or detonation that takes place within the test vehicle is completely contained, produces no noise, and can non-destructively pump a laser. Extensive experimentation with test vehicles to control the detonation wave has improved the brightness and duration of the source. A new fixture has been recently tested. This fixture solves the optical coupling problem by creating an implosion which results in a bright detonation zone approaching the center of the fixture from two opposite directions. The laser rod is located at the center of the fixture and receives the pumping light from both directions. Probe measurements show the light produced in this fixture has a brightness temperature in excess of 7000K and a duration in excess of 200 microseconds. Strong pumping of a neodymium-glass laser rod was accomplished with this fixture, and high order lasing was observed. Future plans with this fixture will include attempts to pump a ruby laser, more strongly to obtain above threshold outputs. (Author)

AD-634 688 **Field 20E, 20L**
CFSTI Prices: HC$1.00 MF$0.50
Army Missile Command, Redstone Arsenal, Ala. Physical Sciences Lab.
INVESTIGATION OF EXCHANGE EFFECTS IN RUBY BY LINE SHAPE COMPARISONS,
by Richard L. Hartman, Harry C. Meyer, Jefferson S. Benett, and Alfred C. Daniel. Jun 66, 16p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Lasers, Line spectrum), (*Ruby, Line spectrum), Ultrasonic radiation, Phonons, Microwave spectroscopy, Paramagnetic resonance, Nuclear spins, Crystal lattices, Hamiltonian, Chromium, Atomic energy levels.

A report is given on studies involving the line shapes obtained by ultrasonic paramagnetic resonance and by electron paramagnetic resonance methods in ruby at 4.2K and having a Cr(3+) concentration ranging from 0.05% to 1.2%.

PB-169 449 **Field 20E**
CFSTI Prices: HC$2.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
A BALLISTIC PENDULUM FOR THE MEASUREMENT OF IMPULSE PRODUCED ON A TARGET MATERIAL BY A FOCUSED LASER BEAM,
by M. P. Handford. Aug 65, 34p Technical rept. TR-65176

Descriptors: (*Lasers, Focusing), (*Microwave amplifiers, Measuring devices (Electrical+Electronic)), Instrumentation, Particle accelerator targets, Balances, Velocity, Damping, Errors, Test equipment (Electronics).

Identifiers: Ballistic pendulum.

A ballistic pendulum technique is described for the measurement of impulse produced by vaporisation of material from a surface on which a laser beam is focused. The instrument is capable of measuring impulses in the range 10-1000 dyne sec.

PB-169 447 **See Field 13A**

PB-169 894 **See Field 20F**

20F. OPTICS

AD-471 653 **Field 20F, 11C**
CFSTI Prices: HC$2.60 MF$0.50
Bausch and Lomb, Inc., Rochester, N. Y. Research and Development Div.
INFRARED COATING STUDIES.
Quarterly rept. no. 9, 14 Jun-14 Sep 65,
by L. Chang. 14 Sep 65, 23p
Contract DA-44-009-AMC-124 (T)
See also AD-600 264.

Descriptors: (*Infrared optical materials, Optical coatings), (*Optical coatings, Infrared optical coatings), Zinc compounds, Tellurides, Sulfides, Lead compounds, Chlorides, Films, Refractive index, Programming (Computers), Reflection, Minerals, Crystals, Silicon compounds, Carbides, Cadmium compounds, Selenium alloys, G-allium compounds, Phosphides, Arsenic alloys, Gallium alloys, Cadmium alloys.

Identifiers: Lead chloride, Reststrahlen, Zinc sulfides, Zinc telluride.

In order to clarify the ambiguity of the refractive indices of some of the filming materials used in the previous reports, efforts were made in this quarter to determine the refractive indices of PbC12, ZnTe and ZnS films. A computing program was written to calculate film indices as a function of substrate index and the measured quarterwave reflectance or transmittance. From the spectrophotometric measurement of the film-substrate combination, the film index is easily determined as the substrate back surface reflection and is taken into consideration by the computations. Also presented in this report is a collection of the reststrahlen reflectance measurements of three minervals (wulfenite, scheelite, and topaz) and several crystalline samples (SiC, CdS, CdSe, GaP and GaAs).

AD-634 658 **Field 20F, 20H**
CFSTI Prices: HC$1.00 MF$0.50
Army Engineer Research and Development Labs., Fort Belvoir, Va.
A MOSSBAUER SPECTROMETER,
by Edward F. Allard. Jun 66, 9p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Spectrum analyzers, *Mossbauer effect), (*Explosive materials, Crystal substructure), Azides, Resonance absorption, Crystal lattice defects, Absorption spectrum.

Identifiers: Picrates.

The theory and operation of a Mossbauer Spectrometer are described, specifically for study of the microstructure of azides and picrates.

N66-16078 **Field 20F**
CFSTI Prices: HC$1.00 MF$0.50
California Univ., Santa Barbara.
EXPERIMENTAL STUDIES IN ULTRAVIOLET SOLID STATE SPECTROSCOPY.
Status rept. Jul 65-Jan 66,
by W. C. Walker. 1966, 9p
Grant NsG-91-60
NASA-CR-69705

Descriptors: *Excited state, *Ultraviolet radiation, *Alkali halide, *Reflectometer.

For abstract, see T 66 15.

PB-169 894 **Field 20F, 7E, 20E**
CFSTI Prices: HC$18.40 MF$1.00
Michigan Univ., Ann Arbor.
THE ANN ARBOR CONFERENCE ON OPTICAL PUMPING, HELD AT THE UNIVERSITY OF MICHIGAN, JUNE 15-JUNE 18, 1959.
1959, 188p

Descriptors: (*Pumping (Optical), Symposia), Spectroscopy, Atomic energy levels, Excitation, Exchange reactions, Atomic clocks, Relaxation time, Line spectrum, Geophysics, Relativity theory, Instrumentation, Masers, Lasers, Nuclear resonance.

Abstracts are given of the papers presented at the conference. Topics covered include: Electron and atomic moments; electron exchange; atomic and ionic exchange experiments; frequency standards; relaxation phenomena; quantum, line shape, and pressure shifts; geophysical and relativistic applications; instruments; masers and lasers; nuclear resonance.

AD-402 842 **See Field 4A**

AD-470 376 **See Field 20E**

AD-634 185 **See Field 20C**

AD-634 229 **See Field 20I**

AD-634 235 **See Field 14B**

AD-634 430 **See Field 14B**

AD-634 535 **See Field 17E**

PB-169 447 **See Field 13A**

20G. PARTICLE ACCELERATORS

AD-634 717 **Field 20G, 20H**
CFSTI Prices: HC$2.00 MF$0.50
High Energy Physics Lab., Stanford Univ., Calif.
A TEST OF THE ELECTRON PROPAGATOR BY MODIFICATION OF THE PRINCETON-STANFORD STORAGE RINGS,
by G. K. O'Neill. May 66, 44p HEPL-440
Contracts Nonr-225 (67), Nonr-1858 (39)
Prepared in cooperation with Palmer Physical Lab., Princeton Univ., N. J.

Descriptors: (*Particle accelerator components, Design), (*Electron beams, Scattering), Linear accelerators, Magnets, Rings, Positrons, Photons, Nuclear reactions, Nuclear cross sections, Luminescence, Vacuum apparatus, Annihilation reactions.

The Princeton-Stanford colliding-beam experiment has verified quantum electrodynamics up to 1.1 GeV/c as far as the photon propagator is concerned, and further runs at 550 MeV during 1966 will extend that limit a factor three in sensitivity. In this report the question of modification of the rings for operation on positron-electron colliding beams at 550 MeV is discussed. It is pointed out that a conversion can be accomplished without major hardware changes, and that the resulting positron-electron storage ring could then be used for a very clean test of the electron propagator up to twice the invariant mass at which an apparent electrodynamic breakdown has been found at CEA. (Author)

BNL-741 (Rev.) **Field 20G**
CFSTI Prices: HC$1.00 MF$0.50
Brookhaven National Lab., Upton, N. Y.
ACCELERATORS OF THE FUTURE.
by John P. Blewett. Sep 65, 12p
Contract AT (30-2)-GEN-16

Descriptors: (*Synchrotrons, Elementary particles), (*Particle accelerators, Design).

For abstract, see T 66 15.

CONF-650922 **Field 20G, 20C, 18D**
CFSTI Prices: HC$8.50 MF$3.50
Stanford Linear Accelerator Center, Stanford Univ., Calif.
PROCEEDINGS OF THE INTERNATIONAL SYMPOSIUM ON MAGNET TECHNOLOGY, STANFORD LINEAR ACCELERATOR CENTER, STANFORD UNIVERSITY, STANFORD, CALIFORNIA, SEPTEMBER 8-10, 1965,
by H. Brechna, and H. S. Gordon. 10 Oct 65, 856p
Contract AT (04-3)-400

Descriptors: (*Magnets, Symposia), (*Linear accelerators, Particle beams).

PB-169 888 **Field 20G**
CFSTI Prices: HC$1.60 MF$0.50
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
LA CONSTRUCTION DE L'ANNEAU DE STOCKAGE ACO D'ORSAY. I: ETAT DES TRAVAUX. II: SYSTEMES DE DETECTION (Construction of the Orsay ACO Storage Ring. I: Progress Report. II: Detecting Systems),
by J. E. Augustin, J. Haissinski, P. C. Marin, F. Rumpf, and E. Silva. Apr 66, 15p CEA-R-2929
Text in French; Attached Summary in English.

Descriptors: (*Particle accelerators, Storage), Particle accelerator components, Pumping (Electronics), France.

A brief progress report is given, with mention of the difficulties solved since the 1963 Dubna Conference, and the extra facilities which will be available on the ring (beam observation and measurements). Typical large solid angle detecting systems and equipment for accurate monitoring under construction at Orsay are also presented. Emphasis is put on some peculiar features of ACO as a tool for physics: long experimental straight section and short length of the bunches. (Author)

SLAC-39 **Field 20G**
CFSTI Prices: HC$3.00 MF$0.75
Stanford Linear Accelerator Center, Stanford Univ., Calif.
MAGNETIC FIELD MEASUREMENT AND SPECTROSCOPY IN MULTIPOLE FIELDS,
by J. K. Cobb, and J. J. Muray. Nov 65, 83p
Contract AT (04-3)-400

Descriptors: (*Linear accelerators, Particle beams), (*Particle beams, Focusing).

SLAC-55 **Field 20G**
CFSTI Prices: HC$2.00 MF$0.50
Stanford Linear Accelerator Center, Stanford Univ., Calif.
MAGNETIC CHARACTERISTICS OF THE ACCELERATOR QUADRUPOLE TRIPLETS,
by J. K. Cobb, and A. W. Burfine. Jan 66, 31p
Contract AT (04-3)-515

Descriptors: (*Particle accelerators, Magnetic properties), (*Magnets, Harmonic analysis).

SLAC-57 **Field 20G**
CFSTI Prices: HC$3.00 MF$0.75
Stanford Linear Accelerator Center, Stanford Univ., Calif.
2-METER SPARK CHAMBER MAGNET MODEL FOR THE DETERMINATION OF FIELD DISTRIBUTION IN SPACE,
by H. Brechna, E. Burfine, R. Mizrahi, and A. Wolff. Jan 66, 72p
Contract AT (04-3)-515

Descriptors: (*Magnetic fields, Measuring devices (Electrical ; Electronic)), (*Electromagnets, Model tests).

UCRL-14697 **Field 20G**
CFSTI Prices: HC$1.00 MF$0.50
Lawrence Radiation Lab., Univ. of California, Livermore.
MEASUREMENTS OF THE PROFILE OF THE ELECTRON BEAM FROM THE ASTRON ACCELERATOR,
by William S. Barnes, and James E. Swain. 3 Mar 66, 12p
Contract W-7405-eng-48

Descriptors: (*Electron beams, Electron density), (*Electron bombardment, Electron accelerators).

Identifiers: Astron.

For abstract, see N 20 12.

UCRL-16553 **Field 20G**
CFSTI Prices: HC$1.00 MF$0.50
Lawrence Radiation Lab., Univ. of California, Berkeley.
BEVATRON OPERATION AND DEVELOPMENT. 46. APRIL-JUNE 1965,
by Kenneth C. Crebbin. 16 Feb 66, 12p
Contract W-7405-eng-48

Descriptors: (*Bevatrons, Operation), (*Reactor shutdown, Bevatrons).

For abstract, see N 20 12.

AD-634 505 **See Field 9A**

ANL-7108 **See Field 18D**

ANL-7139 **See Field 6R**

LA-3479 **See Field 18D**

NBS-TN-283 **See Field 18H**

SLAC-58 **See Field 12A**

UCRL-14450 **See Field 20H**

UCRL-16511 **See Field 18D**

20H. PARTICLE PHYSICS

AD-634 268 **Field 20H, 11F**
Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
RADIATION DAMAGE IN PT PRODUCED BY 1.8-3.0-MeV ELECTRONS.
Physical sciences research papers.
by E. A. Burke, C. M. Jimenez, and L. F. Lowe. 2 Aug 65, 11p AFCRL-PSRP-220, AFCRL-66-291
Proj. AF-5620
Task 562002

Descriptors: (*Platinum, *Electron bombardment), (*Radiation damage, Platinum), Cryogenics, Resistance (Electrical), Crystal lattice defects.

The change in electrical resistivity in Pt, R (E) = delta rho/electron sq cm, was measured in the energy range 1.8-3.0 MeV. The experimental values found in this interval are consistent with a displacement threshold of 37 eV, using the Mott equation for relativistically scattered electrons. The resistivity increase per unit integrated flux at 2.0 MeV was found to be 4.6 x 10 to the minus 26th power ohm cm/electron sq cm, which yields 0.00075 for rho, the resistivity per unit concentration of Frenkel pairs. (Author)

AD-634 351 **Field 20H**
CFSTI Prices: HC$5.00 MF$1.00
Nevis Labs., Columbia Univ., Irvington-on-Hudson, N. Y.
POSITRON SPECTRUM FROM MUON DECAY.
Doctoral thesis,
by John Peoples. May 66, 168p Nevis-147, CU-253
Contract Nonr-266 (72)
R-457

Descriptors: (*Meson reactions, Nuclear spectroscopy), (*Muons, Nuclear reactions), (*Positrons, Nuclear spectorscopy), Nuclear radiation spectrometers, Sound ranging, Nuclear scattering, Annihilation reactions, Neutrinos, Momentum, Errors.

Identifiers: Muon decay, Positron spectrum, Spark chambers.

The positron spectrum from the decay of positive muons was studied using a sonic spark chamber spectrometer. An analysis of 1.1 million events gave a value for the Michel parameter of 0.750 plus or minus 0.003. This number includes internal radiative corrections and is to be compared directly with the 0.750 predicted by the V-A theory. An upper limit on the mass of the muon neutrino was set at 1.5 MeV. (Author)

AD-634 496 **Field 20H, 20J**
CFSTI Prices: HC$3.00 MF$0.75
Princeton Univ., N. J. Elementary Particles Lab.
OBSERVATION OF INTERFERENCE BETWEEN POSITIVE-PION NEGATIVE-PION AMPLITUDES FROM K-L DECAY AND COHERENT REGENERATION.
Technical rept. Jun 64-May 66,
by James S. Russ. 16 May 66, 96p TR-42
Contract Nonr-1858 (06)
Proj. NR-021-048
Doctoral thesis.

Descriptors: (*Meson reactions, Decay schemes), (*Pions, Decay schemes), (*K mesons, Decay schemes), Radiation measurement systems, Nuclear spectroscopy, Beryllium, Hydrogen, Scattering, Antiparticles, Particle beams.

Identifiers: K-meson decay, CP invariance.

A spark chamber - magnetic spectrometer search for interference between positive-pion negative-pion decay amplitudes produced in free K-L decay, in apparent violation of CP invariance in the weak interactions, and from coherent regeneration was performed. Using diffuse beryllium regenerators of different mean densities, evidence was found for maximal constructive interference, independent of the K-S - K-L mass difference. Additional data using a solid beryllium regenerator provides good evidence that the magnitude of the mass difference lies in the interval 0.4 < delta < 0.7 in units of h/S. Data were also taken on regeneration in liquid hydrogen and can be understood on the basis of large constructive interference with no anomalous effects. Optical model calculations of the phase of the regeneration scattering amplitude in beryllium indicate it is largely imaginary, so that the dominant contributions to CP violation are expected to come from the mass matrix and/or Delta I = 3/2 currents. Implications of interference for CP conserving models are discussed. (Author)

AD-634 517 **Field 20H**
CFSTI Prices: HC$2.00 MF$0.50
Aerospace Research Labs., Office of Aerospace Research, Wright-Patterson AFB, Ohio.
LIMITATIONS IN THE ENERGY RESOLUTION OF SLOW ELECTRONS,
by Walter Friz. Apr 66, 34p ARL-66-0061
Proj. AF-7073
Task 707300

Descriptors: (*Electron beams, Energy), (*Electron optics, Resolution), Beta-ray spectrum, Space charge, Electrodes, Particle trajectories, Electrostatics, Magnetic fields, Photoelectric effect, Thermionic emission, Secondary emission.

The study delineates quantitatively the limiting factors in resolution in electron spectrometry at very low energies. It is shown that monochromatic electron beams with energy spread Delta-E/E=0.001 may be produced well below 1 eV provided the necessary and quite possible technological effort is being made. It appears that in conjunction with standard detection schemes space charge effects and their restrictions on beam intensities pose a lower energy limit for attainable monochromatic beams. However, using coincidence counting detection schemes much lower beam intensities will suffice and then physical-chemical surface effects on the electrodes and their influence on the electron trajectories will be determining this limit. (Author)

AD-634 634 **Field 20H, 20I**
CFSTI Prices: HC$1.00 MF$0.50
Army Missile Command, Redstone Arsenal, Ala.
THE SELF-FOCUSING OF INTENSE BEAMS OF RELATIVISTIC-ELECTRONS,
by T. G. Roberts. Jun 66, 14p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Electron beams, Focusing), Plasma medium, X-ray tubes, Electrodes, Gas ionization.

It is shown that a beam of relativistic electrons can be extracted from the electrode space of an X-ray machine, and that these electrons will form a Bennett pinch or at least will not blow up when they enter an ionized medium. The pinched beam of electrons will travel more than 23 centimeters without blowing up, while an electron beam such as this when projected in vacuum blows up drastically in less than 2 centimeters.

AD-634 721 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
Illinois Univ., Urbana. Dept. of Physics.
OBSERVATION OF THE TWO-PHOTON DECAY OF THE NEUTRAL-K2 MESON.
by L. Criegee, J. D. Fox, H. Frauenfelder, A. O. Hanson, and G. Moscati. 1966, 10p COO-1195-61

Descriptors: (*Meson reactions, Decay schemes), (*K mesons, Decay schemes), Photons, Pions, Gamma rays, Monte Carlo method.

An arrangement of spark chambers and scintillation shower detectors was used to investigate the two-photon decay mode of the neutral K2 meson. Twenty-nine candidates were found for this decay mode. However, 12 plus or minus 7 of these events can originate from the neutral-K2 to 3 neutral-pion mode and the CP-violating neutral-K to 2 neutral-pion decay. Monte Carlo simulations indicate that 5 plus or minus 2 of the 12 events are likely to originate from the 3 neutral-pion decays, leaving 7 plus or minus 7 events which may be ascribed to 2 neutral-pion decays. The corresponding branching ratios are: Rate (neutral-K2 to 2 gamma) (neutral-K to all modes) = (1.3 plus or minus 0.6) x 0.0001 + Rate (neutral-K2 to 2 neutral pion)/Rate (neutral-K2 to all modes)=(1.2 + 1.5 or -1.2) x 0.001.

AD-634 756 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
High-Energy Physics Lab., Stanford Univ., Calif.
NEUTRON FORM FACTORS FROM INELASTIC ELECTRON SCATTERING IN TRITIUM AND HELIUM - 3,
by E. B. Hughes, M. R. Yearian, and R. Hofstadter. May 66, 23p HEPL-443
Contract Nonr-225 (67)

Descriptors: (*Neutrons, Nuclear structure), (*Electrons, *Inelastic scattering), (*Tritium, Electron bombardment), (*Helium, Electron bombardment), Nuclear scattering, Nuclear cross sections, Nuclear spectroscopy, Wave functions.

Identifiers: Form factors.

Measurements are reported of the inelastic scattering of electrons from the mirror nuclei of tritium and helium - 3. The ratio of the quasi-elastic electron-tritium and electron-helium -3 cross sections was measured to a precision of about 3% for values of the square of the four-momentum transfer, equal to 2.5 and 4.6/F sq. Detailed measurements of the shape of the entire inelastic spectra and estimates of the total inelastic cross sections were made. While these data are primarily intended to furnish additional experimental information which will be of use in determining the structure of the three-body nuclei, it is also pointed out that such data are a possible source of information on the structure of the neutron. (Author)

ANL-7130 **Field 20H**
CFSTI Prices: HC$4.75 MF$2.00
Argonne National Lab., Ill.
PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON WEAK INTERACTIONS, OCTOBER 25-27, 1965.
1965, 443p CONF-651043
Contract W-31-109-eng-38

Descriptors: (*Elementary particles, Symposia), (*Radioactive decay, Elementary particles).

For abstract, see T 66 15.

BNL-944 **Field 20H, 20L**
CFSTI Prices: HC$1.00 MF$0.50
Brookhaven National Lab., Upton, N. Y.
PASSAGE OF CHARGED PARTICLES THROUGH CRYSTAL LATTICES. BROOKHAVEN LECTURE SERIES NUMBER 46,
by Cavid Erginsoy. 21 Apr 65, 16p
Contract AT (30-2)-GEN-16

Descriptors: (*Charged particles, Crystal lattices), (*Crystal lattices, Radiation damage).

IDO-17107 **Field 20H, 18K**
CFSTI Prices: HC$1.00 MF$0.50
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
EFFECTIVE CROSS-SECTION FACTORS,
by R. G. Nisle. Mar 66, 15p
Contract AT (10-1)-205

Descriptors: (*Isotopes, Resonance absorption).

For abstract, see N 20 13.

N66-14552 **Field 20H**
CFSTI Prices: HC$2.00 MF$0.50
Iowa Univ., Iowa City. Dept. of Physics and Astronomy.
DETERMINATION OF HYDROGEN ION CONCENTRATION, ELECTRON DENSITY AND PROTON GYROFREQUENCY FROM THE DISPERSION OF PROTON WHISTLERS,
by D. A. Gurnett, and S. D. Shawhan. Sep 65, 44p
Rept. no. 65-33
Contract NONR-1509 (06)
NASA-CR-69104, AD-471 499

Descriptors: *Proton, *Asymptotic method, *Electron density, *Hydrogen ion, *Whistler.

ORNL-3805 **Field 20H, 18F, 9B**
CFSTI Prices: HC$2.00 MF$0.50
Oak Ridge National Lab., Tenn.
OGRE - A MONTE CARLO SYSTEM FOR GAMMA-RAY TRANSPORT STUDIES, INCLUDING AN EXAMPLE (OGRE-P1) FOR TRANSMISSION THROUGH LAMINATED SLABS,
by S. K. Penny, D. K. Trubey, and M. B. Emmett. Apr 66, 29p
Contract W-7405-eng-26

Descriptors: (*Neutron transport theory, Gamma rays), (*Monte Carlo method, Programming (Computers)).

Identifiers: Ogre, Ogre P-1.

ORNL-3844 **Field 20H, 9B**
CFSTI Prices: HC$4.00 MF$1.00
Oak Ridge National Lab., Tenn.
INSTRUCTIONS FOR THE OPERATION OF CODES ASSOCIATED WITH THE LOW-ENERGY INTRANUCLEAR CASCADE CALCULATION,
by Hugo W. Bertini, Hemma E. Francis, and Miriam P. Guthrie. Mar 66, 136p
Contract W-7405-eng-26

Descriptors: (*Programming (Computers), Charged particles), (*Charged particles, Nuclear energy).

PB-169 606 **Field 20H**
CFSTI Prices: HC$2.60 MF$0.50
Paris Univ., Orsay (France). Laboratoire de l'Accelerateur Lineaire.
DEUTERON ELECTROMAGNETIC FORM FACTORS FOR 3f TO THE -2nd POWER < q SQ. < 6f TO THE 2nd POWER,
by D. Benaksas, D. Drickey, and D. Frerejacque.
Mar 66, 25p LAL-1155

Descriptors: (*Deuterons, Electron bombardment), Electrons, Elastic scattering, Deuterium, Recoil atoms, Neutrons, Nuclear cross sections, Electron beams, Nuclear spectroscopy, Protons, Electromagnetic properties, France.

Identifiers: Form factors.

Two groups of measurements were made on the elastic scattering of electrons by deuterium; in each case the recoil deuteron was observed instead of the scattered electron. In the first case the spectrometer was set at 45 degrees so that magnetic scattering was unimportant (about 10%) and the electric form factors of the deuteron were observed. In the second case deuterons were observed at 0 degrees permitting direct measurement of the magnetic form factor of the deuteron. Form factors of the neutron were deduced from these measurements for the transfer values q sq = 3, 4, and 5 (f to the 2nd power). Preliminary results were given in Phys. Rev. Letters v13 p353 1964. Also included is a description of the experimental set-up, and relativistic and exchange current corrections are discussed. (Author)

PB-169 607 **Field 20H**
CFSTI Prices: HC$3.60 MF$0.50
Paris Univ., Orsay (France). Laboratoire de l'Accelerateur Lineaire.
DISPERSION CORRECTIONS TO ELECTRON SCATTERING IN C12 AND O16,
by A. Bottino, G. Ciocchetti, and A. Molinari. Jan 66, 33p LAL-1153
Prepared in cooperation with Torino Univ. (Italy). Istituto di Fisica.

Descriptors: (*Electrons, Nuclear scattering), (*Nuclear scattering, Electrons), (*Carbon, Electron bombardment), (*Oxygen, Electron bombardment), Elastic scattering, Inelastic scattering, Nuclear energy levels, Field theory, Electromagnetic properties, Approximation (Mathematics), Nuclear models, France.

Identifiers: Form factors.

Calculations of the dispersive corrections to elastic (O16 and C12) and inelastic (C12) electron scattering are done in second Born approximation taking as intermidiate nuclear levels the most excitable by means of electron scattering. Dispersive effects of the order of 1/Z are found at the diffraction minima of the form factors and for high energy and large angles. Wave distortions in the inelastic scattering are also briefly discussed. (Author)

PB-169 889 **Field 20H, 4A**
CFSTI Prices: HC$5.60 MF$0.50
Commissariat a l'Energie Atomique, Fontenay-Aux-Roses (France). Centre d'Etudes Nucleaires.
MESURE DE L'INTENSITE TOTALE D'IONISATION AU VOISINAGE DU SOL ET SEPARATION DES DIFFERENTES COMPOSANTES (Measurement of the Total Ionization Intensity Near the Ground and Separation of the Various Components).
Doctoral thesis in French,
by Philippe Grevet. 15 Jun 65, 55p CEA-R-28806
Text in French; Attached Summary in English.

Descriptors: (*Ionization, Measurement), Alpha particles, Beta particles, Gamma rays, Ions, Radiation measurement systems, Meteorological parameters, Geography, Radioactivity, France.

The aim was to measure the total amount of ion-pairs produced in the air per unit time and unit volume. It is possible, by using continuous recording to study the variations in the ionisation due to alpha, beta, and gamma radiation at a height of one metre. The apparatus which has been developed consists of two chambers of 120 litres: one, hermetically sealed detects the gamma component, the other with a circulation of the ambient air detects the alpah and gamma; it is thus possible by difference to evaluate the alpha component. The chambers and the associated electronic equipment have been designed for continuous operation in the open air. Another chamber without walls can be used for measuring directly the total ionisation intensity and from this an approximate calculation may be made of the beta component. A series of recordings has been made near Saclay where the natural radio-activity level is moderate, and in regions of low and high activity (near the sea and in the CEA's mining divisions). It has thus been possible to show the variation in the gamma component as a function of the geographic position of the measurement (from 3.7 to 6.3 l/cu cm-sec), the very large variations of the alpha component at a given place with changing meteorological conditions (from 1.5 to 45 l/cu cm-sec at Saclay for example) on the far smaller variations in the beta component. (Author)

TID-20444 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
Illinois Univ., Urbana. Dept. of Physics.
THE REACTION K MINUS + P to K + PI + N AT 1.34 BEV/C,
by J. R. Ficenec, R. I. Hulsizer, and W. P. Swanson.1963, 12p
Contract AT (11-1)-1195

Descriptors: (*Elementary particles, Nuclear spins), (*Nuclear resonance, Elementary particles).

UCRL-14403 **Field 20H**
CFSTI Prices: HC$4.00 MF$1.00
Lawrence Radiation Lab., Univ. of California, Livermore.
THEORETICAL DIFFERENTIAL SCATTERING CROSS SECTIONS OF X RAYS FOR H, HE, LI, LI PLUS, BE, B, C, AND C IN THE VALENCE STATE,
by R. J. Stinner, W. H. McMaster, and N. Kerr Del Grande.23 Sep 65, 147p
Contract W-7405-eng-48

Descriptors: (*X rays, Differential cross section), (*Differential cross section, Scattering).

For abstract, see N 20 12.

UCRL-14450 Field 20H, 20G, 20H
CFSTI Prices: HC$2.00 MF$0.50
Lawrence Radiation Lab., Univ. of California, Livermore.
PRODUCTION OF METASTABLE ATOMS BY ELECTRON IMPACT.
Doctoral thesis,
by Jerry T. Dowell. 9 Dec 65, 52p
Contract W-7405-ENG-48

Descriptors: (*Helium group gases, Excitation), (*Electron beams, Gas ionization).

UCRL-16469 Field 20H
CFSTI Prices: HC$6.00 MF$0.75
Lawrence Radiation Lab., Univ. of California, Berkeley.
A MEASUREMENT OF THE ANOMALOUS GYROMAGNETIC RATIO OF THE MUON,
by G. Schrank, G. R. Henry, and R. Swanson. 28 Oct 65, 126p
Contract W-7405-eng-48

Descriptors: (*Muons, Magneto-optic effect), (*Magnetic fields, Muons).

For abstract, see N 20 12.

AD-455 960 See Field 20J

AD-634 287 See Field 20I

AD-634 295 See Field 18B

AD-634 339 See Field 20J

AD-634 340 See Field 20J

AD-634 534 See Field 18H

AD-634 658 See Field 20F

AD-634 703 See Field 20J

AD-634 704 See Field 4A

AD-634 705 See Field 20J

AD-634 706 See Field 20J

AD-634 717 See Field 20G

ANL-7096 See Field 7E

ANL-7108 See Field 18D

ANL-7152 See Field 18D

BNWL-113-12 See Field 7E

BNWL-113-13 See Field 7E

BNWL-234 See Field 9B

DP-949 See Field 18H

LA-3479 See Field 18D

MLM-1263 See Field 9B

NBS-TN-283 See Field 18H

ORNL-3900 See Field 7E

PB-169 890 See Field 18D

RFP-647 See Field 11F

SLAC-58 See Field 12A

UCRL-14450 See Field 20H

UCRL-14538 See Field 18I

UCRL-16511 See Field 18D

20I. PLASMA PHYSICS

AD-403 653 Field 20I
CFSTI Price: HC$5.60
Lincoln Lab., Mass. Inst. of Tech., Lexington.
THE SURFACE RESISTANCE OF HIGH-CURRENT MICROWAVE DISCHARGES IN ARGON,
by C. E. Muehe, and T. J. Fessenden. 20 Mar 66, 55p Rept. no. 46G-2
Contract AF 19(628)-500, ARPA Order-85

Descriptors: (*Argon, Plasma physics), (*Plasma physics, Argon), Microwaves, Radio fields, Digital computers, Magnetic fields, Electrical double layer, Surface properties, Resistance, Gas discharges, Gas ionization.

A digital computer was used to determine the electric and magnetic fields in an argon plasma with sufficient electron density so that the applied microwave fields are shielded from the interior of the discharge by the skin effect. An approximate method of determining the surface resistance, not requiring a computer, is also given. Some experimental results confirming the theory are presented. (Author)

AD-417 361 Field 20I
CFSTI Price: HC$6.60
Unified Science Associates, Inc., Pasadena, Calif.
STABLE DENSE COLD PLASMA.
Semiannual technical summary rept., for 20 Aug 63,
by S. Naiditch. 9 Sep 63, 64p
Contract Nonr-3437 (00), ARPA order-194
See also AD-401 678.

Descriptors: (*Plasma medium, Simulation), (*Sodium, Solutions), (*Ammonia, Solutions), Electrical conductance, Relaxation time, Density, Stability, Low-temperature research.

Identifiers: Metal-ammonia solutions.

Electrical conductivities of sodium-ammonia solutions were measured from -80 to +185C, i.e., most of the liquid range and some of the gaseous range. The objective of these studies is the exploration of the possibility of using such gaseous solutions as plasma sources. The attractive features of these gases include plasma lifetimes in excess of 3,000 seconds (the plasmas being at equilibrium), temperatures as low as 134C and electrical conductivities of at least 100 mhos/cm. Visual appearances of the dense gases are the same as those of the liquids. Gases with low concentrations of sodium are blue and ones with high concentrations are yellow-red metallic copper-gold. Electrical conductivities of the liquids increase with increasing temperature until conductivity maxima are reached at 80 to 100C. In dilute solutions, the temperatures of these maxima are close to the solution critical temperatures; because of this, conductivities of supercritical gases have been measured that are higher than the conductivities of the liquids of the same mole fractions at room temperature. (Author)

AD-460 839 Field 20I
CFSTI Price: HC$6.60
Polytechnic Inst. of Brooklyn, N. Y. Dept. of Aerospace Engineering and Applied Mechanics.
A KINETIC THEORETICAL INVESTIGATION OF A FULLY IONIZED GAS. PART I. PARADOXES IN THE B-B-G-K-Y HIERARCHY.
Interim rept.,
by Toyoki Koga. Jan 65, 64p PIBAL-863
Contract Nonr-839 (38)
Proj. NR-061-135

Descriptors: (*Plasma medium, Kinetic theory), (*Kinetic theory, Plasma medium), Electrons, Ions, Probability, Theory, Statistical mechanics, Distribution functions.

It is first assumed that a constituent particle in an electron gas (or a fully ionized gas) interacts with more than one particle at the same time and that the mutual interactions among these particles are simultaneously significant. Directing attention to the usage of the hypothesis of equal a priori probabilities, the plausibility of customary methods considering the B-B-G-K-Y hierarchy for the basis of deriving kinetic equations for electron gases is investigated. Conditions imposed upon the hierarchy do not seem consistent with the assumption set forth above. Main questions are raised regarding (1) the assumption of characteristic time scales and (2) the assumption that a set of multiple interactions are, in effect, equivalent to a superposition of binary interactions. The situation is similar regarding other theories advanced hitherto without being based on the hierarchy. (Author)

AD-464 742 Field 20I
CFSTI Price: HC$7.60
Polytechnic Inst. of Brooklyn, N. Y. Dept. of Aerospace Engineering and Applied Mechanics.
A KINETIC THEORETICAL INVESTIGATION OF A FULLY IONIZED GAS. PART II. SOME ASPECTS OF MULTIPLE COLLISIONS,
by Toyoki Koga. Jan 65, 79p PIBAL-863
Contract Nonr-839 (38)
Proj. NR-061-135
See also AD-460 839.

Descriptors: (*Plasma medium, Kinetic theory), (*Kinetic theory, PLASMA medium), (*Brownian movement, Plasma medium), Gas ionization, Statistical processes, Electrons.

Identifiers: Particle interactions.

The Brownian motion of a test body due to multiple interactions with field particles is investigated within or almost within the framework of Markoff's processes. First, Markoff's processes are studied as presenting such multiple interactions. Based on the study and by means of Markoff's method of random flights, an investigation is made of the Brownian motion of an elastic test body submerged in a rarefied gas constituted of elastic molecules, under the condition that mutual interactions among field particles are negligible. It is shown that there is no difference in effect between temporal repetitions of random binary collisions and multiple collisions (random binary collisions superposed at one moment of time), so far as the friction and diffusion of the test body in momentum space are concerned. A kinetic theoretical scheme of treating fully ionized gas in the light of this fact is proposed. (Author)

AD-634 229 Field 20I, 20F, 14B
CFSTI Prices: HC$1.00 MF$0.50
Department of the Navy, Washington, D. C.
FABRY-PEROT INTERFEROMETER IN THE MICROWAVE REGION OF THE SPECTRUM AND ITS USE FOR PLASMA DIAGNOSTICS,
1966, 12p Translation-2198
TT 66-61472
Interferometer Fabri-Pero Mikrovolnovoi Oblasti Spektra i ego Prienenie dlya Diagnostiki Pmlazmy, trans. of Zhurnal Prikladnoi Spektroskopii (USSR) v3 n4 p311-9 1965.

Descriptors: (*Interferometers, Microwave frequency), (*Plasma medium, Analysis), Resolution, Wave transmission, Diffraction, Resonance, Hydrogen, Electron density, USSR.

Identifiers: Fabry-Perot interferometers, Plasma diagnostics.

Investigations were made of the resolving power and transmissivity of a Fabry-Perot interferometer in the microwave region of the spectrum. The possibilities for using this instrument for plasma diagnostics are shown.

AD-634 253 Field 20I
CFSTI Prices: HC$2.00 MF$0.50
Innsbruck Univ. (Austria). Inst. for Theoretical Physics.
MAGNETOHYDRODYNAMIC PROPULSION,
by H. Friedel, and K. Lackner. 5 Dec 65, 33p
Scientific-29
Contract AF 61 (052)-675
AFOSR-66-0942

Descriptors: (*Plasma accelerators, *Magnetohydrodynamics), Austria, Potential theory, One-dimensional flow, Two-dimensional flow, Plasma physics, Partial differential equations, Differential geometry, Equations of motion.

The applicability of magnetogasdynamic concepts to the description of the flow in plasma accelerators is studied. Two methods are proposed for the theoretical treatment of steady crossed-field and travelling wave accelerators. (Author)

AD-634 263 **Field 20I**
CFSTI Prices: HC$1.00 MF$0.50
Boeing Scientific Research Labs., Seattle, Wash. Plasma Physics Lab.
THE EFFICIENT UTILIZATION OF AN RF POWER OSCILLATOR FOR PRODUCING LOW-PRESSURE PLASMAS,
by Melvin J. Kofoid. Apr 66, 23p D1-82-0522
Also available from the author.

Descriptors: (*Plasma generators, *Radiofrequency oscillators), Discharge tubes, Heaters, Low-pressure research, Plasma medium, Electromagnetic properties.

In an ordinary arrangement for high-frequency plasma heating a discharge tube is placed inside an RF coil and the coil is simply connected to a standard power oscillator. If a low-pressure plasma is to be produced, i.e., in gas at 0.1 - 500 microns pressure, the energy transferred to the plasma then will be only a small fraction of the generator capacity, because of the low power factor of the load. Simple expedients are described which result in the attainment of a much increased RF magnetic flux density in the discharge tube. The resulting increase in the plasma conductivity, hence in the load power factor, is sufficient to effect high and efficient loading. The discussion centers around the use of a 15 kW 450 kc/sec oscillator for plasma research studies. The usefullness of the generator is considerably increased by electronic control which allows times of operation as brief as 0.05 sec. Short-time operation and low average loading permit the exceeding of normal oscillator current limits to obtain high RF fields for starting and maintaining low pressure plasmas--extending the possible range of operation. Comprehensive performance data are presented. (Author)

AD-634 274 **Field 20I**
CFSTI Prices: HC$2.00 MF$0.50
Illinois Univ., Urbana. Coordinated Science Lab.
PARAMETRIC EFFECTS OF RADIATION ON A PLASMA,
by E. Atlee Jackson. Jun 66, 40p Rept. no. R-298
Contract DA-28-043-AMC00073 (E)
Proj. DA-20014501B31F

Descriptors: (*Plasma medium, Excitation), Electromagnetic waves, Plasma oscillations, Frequency, Harmonics, Approximation (Mathematics).

The parametric excitation of the modes of an infinite plasma by intense incident radiation is tudied on the basis of the Vlasov equation. It is found that the modes can be driven into unstable oscillations for incident frequencies in the three regions omega-null = approx. omega-pe, omega-pe + omega-i and 2 omega-pe where omega-pe is the electron plasma frequency, and omega-i is the ion acoustic frequency. In the limit of weak intensities, the features of the two resonances, omega-null = approx. omego,-pe + omega-i and 2 omega-pe are found to be in substantial agreement with the results of DuBois and Goldman. For larger intensities it is found that the resonance omega-null = approx. omega-pe + omega-i is restricted to frequencies, omega-null, which are not more than 4 omega-pi above this value, and have a maximum growth rate of .05 omega-pe. The resonance near omega-null = approx. omega-pe is found to be dominated by collisional damping if (gamma/omega-pe) > 0.0001, and limited to a range of frequencies omega-null of only omega-pi/100. The present results, for large intensities, only partially agree with the results obtained by Silin, who only studied one of the present resonances. These results indicate that the usual harmonic approximation for the plasma is not justified in the study of optical mixing. (Author)

AD-634 287 **Field 20I, 20H**
CFSTI Prices: HC$1.00 MF$0.50
California Inst. of Tech., Pasadena.
SINGLE PULSE RESPONSE OF A PLASMA.
Technical rept.,
by Roy W. Gould. May 66, 10p TR-31
Contract Nonr-220(50)

Descriptors: (*Plasma physics, *Cyclotron resonance phenomena), Coherent scattering, Electrons.

The conjecture by Hirschfield and Wachtel that a weak pulse of radiation can trigger the emission of a large delayed burst of coherent electron cyclotron radiation is examined critically. The effect is found to exist when the electrons have a single velocity perpendicular to the magnetic field, but disappears in a thermal equilibrium distribution. (Author)

AD-634 300 **Field 20I**
CFSTI Prices: HC$1.00 MF$0.50
Naval Radiological Defense Lab., San Francisco, Calif.
NRDL 70-INCH CYCLOTRON EXTERNAL ION OPTICS SYSTEM,
by Daniel J. Horen. 14 Jun 66, 14p USNRDL-TR-1008
Task 1601

Descriptors: (*Cyclotrons, Ion beams), (*Ions beams, Focusing), Ion accelerators, Magnets, Electromagnetic lenses.

Identifiers: Ion optics.

The initial external ion-optics system for the NRDL 70-inch cyclotron is presented. Initially, four experimental target areas will be developed. The magnetic components consist of a homogeneous-field, circular switching magnet, an inhomogeneous field analyzing magnet and two element quadrupole magnets. Focussed or defocussed, unanalyzed beams will be available for biomedical research and irradiations of nuclear chemistry targets. An unanalyzed but focussed beam will be provided for irradiating neutron producing targets for neutron shielding studies, and an analyzed beam for nuclear reaction studies. A schematic diagram of the beam handling system is included. (Author)

AD-634 500 **Field 20I, 22C, 4A**
CFSTI Prices: HC$16.50 MF$1.00
Electro Jet Corp., Washington, D. C.
EXISTENCE OF PLASMA CLOUDS AROUND SATELLITES.
Final rept.,
by Richard T. Bettinger, Evan H. Walker, S. Fred Singer, and Louis J. Poudre. 30 Nov 61, 169p
Contract NObs-84714

Descriptors: (*Satellites (Artificial), *Plasma sheath), (*Ionization trails, Satellites (Artificial)), Astronautics, Superaerodynamics, Plasma physics, Radio waves, Electromagnetic wave reflections, Magneto-optic effect, Atmospheric sounding.

Contents: Experimental studies of the Kraus Effect; Plasma sheath and screening around a rapidly moving body; Plasma compression effects produced by space vehicles in a magneto-ionic medium; Reflection of radio waves incident on boundary surfaces with application to the theory of the Kraus effect; Coulomb Drag Test Vehicle; Report on University of Maryland ionospheric probe system.

AD-634 521 **Field 20I, 20D, 20C**
CFSTI Prices: HC$3.00 MF$0.75
Maryland Univ., College Park.
A CRITICAL SURVEY OF MAGNETOFLUID DYNAMICS.PART IV. MODERN ASPECTS OF MAGNETOFLUID DYNAMICS (TENSOR ELECTRICAL CONDUCTIVITY AND MULTIFLUID THEORY).
Final rept.,
by Shih-I Pai. Mar 66, 64p
Contract AF 33 (657)-7805
Proj. AF-7063
ARL-66-0060-Pt-4

Descriptors: (*Magnetohydrodynamics, Theory), Electrical conductance, Tensor analysis, Plasma physics, Fluid flow.

This report gives a critical survey of modern aspects of magnetofluid dynamics (MFD) based on multifluid theory with special emphasis on the new features different from the classical magnetofluid dynamics discussed in Part I of this survey. First the fundamental equations of multifluid theory of MFD are discussed and their effects on the electrical current density, the Hall current and ion slip, are treated. Then we re-examine many typical flow problems of MFD with tensor electrical conductivity or by multifluid theory, which include quasi-one dimensional flow, MFD channel flow, Rayleigh flow, linearized theory, wave motion, boundary layer flow, heat transfer problem, electrical characteristic of Langmuir type probe. These results are compared with those obtained by classical MFD single fluid theory with scalar electrical conductivity. (Author)

AD-634 596 **Field 20I, 14B**
CFSTI Prices: HC$6.00 MF$1.25
Toronto Univ. (Ontario). Inst. for Aerospace Studies.
THEORY OF SPHERICAL AND CYLINDRICAL LANGMUIR PROBES IN A COLLISIONLESS, MAXWELLIAN PLASMA AT REST,
by James G. Laframboise. Jun 66, 211p UTIAS-100
Grants AF-AFOSR-366-63, AF-AFOSR-366-64

Descriptors: (*Plasma medium, *Langmuir probes), Theory, Spheres, Cylindrical bodies, Electric currents, Computers, Integral equations, Canada.

A method was developed and used to obtain theoretical predictions of the current collected from a collisionless, fully Maxwellian plasma at rest by an electrically conducting Langmuir probe having spherical or cylindrical symmetry. The probe characteristic, or functional relation between current and probe potential, was determined for both geometries for probe radii up to 100 times the Debye shielding distance of the hotter species of charged particle, for a complete range of ion-to-electron temperature ratios and for probe potentials from -25 to + 25 times the thermal energy of the hotter species. Each current collection result is computed to a relative accuracy of 0.002 or better in an average time of approximately two minutes on the IBM 7094. Explicit comparison is made between the results for a completely Maxwellian plasma and those for a plasma mono-energetic in attracted particles, as treated by Bernstein and Rabinowitz, Lam, and Chen. It is shown that in certain cases, the mono-energetic plasma does not adequately simulate the Maxwellian plasma.

AD-634 767 **Field 20I, 20D, 20M**
CFSTI Prices: HC$4.00 MF$1.00
Naval Ordnance Lab., White Oak, Md.
NONEQUILIBRIUM EFFECTS ON ENERGY TRANSFER IN AN IONIZED FLUID FLOW.
Final rept.,
by John O. Powers. 11 Apr 66, 131p NOLTR-66-59, Aerodynamics Research-260

Descriptors: (*Plasma medium, *Transport properties), (*Fluid flow, Plasma medium), Nonequilibrium flow, Thermodynamics, Electrical conductance, Energy.

Identifiers: Energy transfer.

A multi-fluid theory is formulated and the resulting equation system is developed and then applied to an ionized fluid flow situation in order to evaluate the mechanisms of energy transfer. The effects of temperature and compositional nonequilibrium were explored for several temperature levels and for a range of fluid flow velocities. Comparisons of the multi-fluid theory results are made with results from conventional single-fluid theory for approximately equivalent fluid flow conditions. The multi-fluid theory investigations produced results which were generally consistent with the single-fluid theory procedures. The multi-fluid results were useful in evaluating the relative importance of the several different energy transfer mechanisms. In particular, it was demonstrated that conditions which yield electron temperatures greater than the heavy particle temperature led to a reduction in total heat transfer with increased electron temperature. (Author)

PB-169 897 **Field 20I**
CFSTI Prices: HC$4.60 MF$0.50
Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
TEMPERATURE DISTRIBUTION IN A POISEUILLE PLASMA ARC,
by Hsing Chuang. Jul 64, 44p, Technical rept. TR-8
Grant NSF-GP-414

Descriptors: (*Plasma medium, Temperature), Distribution, Electric arcs, Discharge tubes, Argon, Helium, Spectroscopy, Line spectrum, Intensity, Gas ionization.

Temperature distribution in an argon and a helium plasma generated in a wall-stabilized arc was studied. Good agreement between temperatures obtained by different methods of measurement was shown. (Author)

AD-418 281 **See Field 10A**

AD-634 129 **See Field 9A**

AD-634 130 **See Field 9A**

AD-634 161 **See Field 20E**

AD-634 358 **See Field 4A**

AD-634 634 **See Field 20H**

LA-3442 **See Field 18A**

ORNL-3908 **See Field 18A**

UCRL-14285 **See Field 18A**

20J. QUANTUM THEORY

AD-422 500 **Field 20J, 12A**
CFSTI Price: HC$2.60
Lincoln Lab., Mass. Inst. of Tech., Lexington.
TRANSLATIONALLY COVARIANT HAMILTONIANS,
by H. E. Moses, and J. S. Lomont. 26 Aug 63, 24p Technical rept. TR-326
Contract AF 19 (628)-500, ARPA Order-13

Descriptors: (*Hamiltonian, Quantum mechanics), (*Quantum mechanics, Special functions), (*Topology, Quantum mechanics), Electromagnetic fields, Operators (Mathematics), Groups (Mathematics), Transformations (Mathematics), Equations, Differential equations, Electric fields, Magnetic fields, Partial differential equations.

It is shown that invariance of certain nonrelativistic particle dynamical systems under space-time translations implies periodicity of the electromagnetic fields. (Author)

AD-455 960 **Field 20J, 20H**
CFSTI Price: HC$1.60
Army Missile Command, Redstone Arsenal, Ala. Physical Sciences Lab.
FULLY SECOND-QUANTIZED HAMILTONIAN FOR INTERACTING ELECTRONS AND PHONONS,
by C. Alton Coulter, D. W. Howgate, and R. A. Shatas.30 Nov 64, 20p
Proj. DA-1L013001A91A
AMC-RA-RR-TR-64-18

Descriptors: (*Phonons, Quantum mechanics), (*Quantum mechanics, Operators (Mathematics)), Hamiltonian, Electrons, Ions, Valence, Harmonic oscillators, Green's function.

The phonon operators used in describing interacting electron-phonon systems in terms of a second-quantized Hamiltonian Equation are commonly derived from the first-quantized Hamiltonian of the harmonic oscillator, and are therefore not the true creation and annihilation operators of the second-quantized formalism. In this report the multiparticle Schrodinger equation for an electron-ion system is used as the starting point for a derivation of the fully second-quantized Hamiltonian Equation, which is expressed in terms of the correct creation and annihilation operators for both electron and phonon fields. The two most significant steps taken in this derivation are the transition from the Schrodinger equation to the corresponding second-quantized Hamiltonian, and the introduction of the true electron and phonon creation and annihilation operators which arise from the expansion of the electron and phonon field operators in appropriate sets of one-particle wave functions. It is then shown that the conventional phonon operators are equivalent to certain bilinear combinations of the true phonon creation and annihilation operators, at least in the subspace of states having only one particle present in each of the vibrational modes; and the equality of the conventional and of the fully second-quantized Hamiltonians within this subspace of states follows immediately. Finally, it is pointed out that several significant advantages are obtained by using the fully second-quantized Hamiltonian rather than the conventional Hamiltonian in applications of the temperature-dependent double-time Green's function method. (Author)

AD-634 257 **Field 20J, 12A**
CFSTI Prices: HC$2.00 MF$0.50
RAND Corp., Santa Monica, Calif.
THE NULL BUNDLE OF AN EINSTEIN-RIEMANN SPACE III: EXTENSION,
by Dominic G. B. Edelen. Jun 66, 45p RM-4873-PR
Contract AF 49 (638)-1700
See also AD-628 330.

Descriptors: (*Tensor analysis, Field theory), (*Relativity theory, *Partial differential equations), Differential geometry, Algebraic topology, Gravity.

Identifiers: Einstein-Riemann space.

The memorandum obtains extensions of the previous results and applies them to a larger class of spaces described by the Einstein field equations of general relativity. The result is a system of partial differential equations involving only scalar unknowns and having certain important homogeneity properties. These properties allow the researcher to obtain a number of new solutions of the field equations that aid in understanding the implications of gravitational fields. (Author)

AD-634 339 **Field 20J, 20H**
CFSTI Prices: HC$1.00 MF$0.50
Illinois Univ., Urbana. Dept. of Physics.
SPIN EFFECTS ON TRIANGLE GRAPHS,
by Melvin Month. 1966, 18p
Contract Nonr-1834 (05)

Descriptors: (*Nuclear spins, Graphics), Elementary particles, Momentum, Wave functions, K mesons, Proton reactions, Pions, Meson reactions.

It is shown that the triangle amplitude can be written as the scalar graph multiplied by a factor which contains only the characteristics of the external particles. In the case where the spins of the external particles are summed, their angles averaged, and where only one partial wave set (that is, a set of relative orbital angular momenta among the final state particles) is retained, then this multiplicative factor is just a product of appropriate 3-momenta. The case K (+)p to K 3pi pi at 3 BeV/c is considered; and it is demonstrated that the correct inclusion of threshold factors does not diminish the effect calculated by Halpern and Watson (Phys. Rev. v131 p2674 1963). (Author)

AD-634 340 **Field 20J, 20H, 7D**
CFSTI Prices: HC$1.00 MF$0.50
Illinois Univ., Urbana. Dept. of Physics.
A 'SIGMA PI PI' MASS ENHANCEMENT AND A NEARBY TRIANGLE SINGULARITY,
by Melvin Month. 1966, 16p
Contract Nonr-1834 (05)

Descriptors: (*Nuclear spins, Graphics), (*Meson reactions, Resonance), (*Sigma hyperons, Resonance), Nuclear energy levels, N-body problem, K mesons, Pions, Meson beams, Momentum.

The enhancement observed in the ' (Sigma 2pi) (+)'system at about 1660 MeV is described using a triangle diagram which has an intermediate state composed of a positive-pion and a Y sub o * (1520). In view of this, it is suggested that this enhancement does not represent the three particle decay mode of the Y sub 1 * (1660), but that rather it is the result of a final state interaction mechanism. (Author)

AD-634 445 **Field 20J, 20L**
CFSTI Prices: HC$3.00 MF$0.50
University Coll. of South Wales and Monmouthshire, Cardiff. Dept. of Applied Mathematics.
PHONON CASCADE THEORY.
Scientific rept.,
by E. F. Smith, and P. T. Landsberg. Nov 65, 52p Scientific-5
Contract AF 61 (052)-664
AFCRL-66-222

Descriptors: (*Phonons, Theory), (*Electron capture, Theory), (*Color centers, Electron capture), Electron capture, Nuclear cross sections, Bosons, Nuclear reactions, Germanium, Silicon, Emissivity, Atomic energy levels, Great Britain.

A generalized formulation is given of the Lax electron cascade capture model. An electron capture cross-section is obtained, via an essentially classical argument, in terms of quantum mechanical transition probabilities, which may include various suitable electron-boson interactions. The electronic potential energy, in the presence of an impurity centre, was assumed to behave as r to the -nth power. Cross-sections were obtained for the electron-acoustic and optical phonon interactions. In the latter case cross-sections were obtained for both neutral (n=4) and Coulomb attractive centres (n=1), in germanium and silicon, the 'sticking probabilities' being taken from previous literature. When comparable with earlier work, the cross-sections obtained are smaller (by at most a factor 10). New estimates include cross-sections for electron capture by neutral centres in silicon, with optical phonon emission, over a range of temperatures. (Author)

AD-634 667 **Field 20J, 20N, 20L**
CFSTI Prices: HC$1.00 MF$0.50
Harry Diamond Labs., Washington, D. C.
WAVEGUIDE ANALOG OF TUNNELING THROUGH QUANTUM POTENTIAL BARRIERS,
by Morris Campi. Jun 66, 14p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Tunneling (Electronics), Simulation), (*Waveguides, Tunneling (Electronics)), Electromagnetic waves, Propagation, Crystal lattices, Potential theory, Wave functions, Wave transmission.

Quantum potential barriers were simulated by a section of waveguide having a particular configuration and the particle tunneling phenomenon was simulated by electromagnetic propagation in waveguide. When an effective barrier length of approximately 1.15 to 1.19 times the actual length is used, there is good correlation with theory in transmission coefficient measurements for both abrupt and slowly varying potential barriers. (Author)

AD-634 703 **Field 20J, 20H**
CFSTI Prices: HC$1.00 MF$0.50
Maryland Univ., College Park. Dept. of Physics and Astronomy.
ON THE OFF-DIAGONAL MASS MATRIX ELEMENT OF THE NEUTRAL K SYSTEM.
Technical rept.,
by Ching-Hung Woo. Nov 65, 11p TR-521
Grants AF-AFOSR-500-64, AF-AFOSR-42-64

Descriptors: (*Meson reactions, Theory), (*K mesons, Meson reactions), Pions, Decay schemes, Mathematical models, Antiparticles.

Identifiers: CP invariance.

A recent interference experiment of Fitch et al. has been interpreted as suggesting that the imaginary part of the off-diagonal neutral-K - anti-neutral-K mass matrix is mainly responsible for the observed CP noninvariance in 2-pion decay, whereas the imaginary parts of the width matrices are negligible. In this note a study is made of the consistency of such a proposition with simple theoretical models. (Author)

AD-634 705 **Field 20J, 20H**
CFSTI Prices: HC$1.00 MF$0.50
Maryland Univ., College Park. Dept. of Physics and Astronomy.
THE USE OF UNITARITY IN PROVING POMERANCHUK'S THEOREM ON CROSS SECTIONS AT HIGH ENERGIES.
Technical rept.,
by R. J. Eden. Nov 65, 8p TR-525
Grant AF AFOSR-500-64

Descriptors: (*Elementary particles, Nuclear cross sections), (*Nuclear scattering, Field theory), Energy, Theory, Antiparticles.

Identifiers: Pomeranchuk's theorm, Unitarity.

For abstract, see T 66 15.

AD-634 706 **Field 20J, 20H**
CFSTI Prices: HC$1.00 MF$0.50
Maryland Univ., College Park. Dept. of Physics and Astronomy.
HIGH ENERGY BEHAVIOUR OF SCATTERING AMPLITUDES AND CROSS SECTIONS USING CROSSING SYMMETRY AND HOLOMORPHY IN TWO VARIABLES.
Technical rept.,
by R. J. Eden. Dec 65, 8p TR-532
Grant AF-AFOSR-500-64

Descriptors: (*Nuclear scattering, Mathematical analysis), (*Nuclear cross sections, Mathematical analysis), Field theory, Groups (Mathematics), Special functions (Mathematical).

Identifiers: Holomorphic functions, Symmetry (Quantum mechanics).

For a symmetric amplitude F + (Z,t) (for example the sum of positive-pion - proton and negative-pion - proton scattering amplitudes), where Z = E + t/4m, and E is the centre of mass energy; crossing symmetry and hermitean analyticity lead to the relation, for Z real, F + (-Z + iO,t) = F + *(Z + iO,t). This is an exact relation and can be used to determine not only the phase of the leading term for large Z, but also of other terms except for ambiguities in sign, which are resolved by other conditions. In this paper smooth functions are used that involve powers of E or of log E for which one can easily show that: if Imf + (E) = E exp. alpha, then f + (E) = plus or minus (-iE) exp. alpha C + if Imf + (E) = (log E) exp. beta, then f + (E) = + (log E - i (pi)/2) exp. beta. It is shown how these results from crossing and analyticity in E can be combined with holomorphy in the variable t and temperedness in E within the domain of holomorphy. The method is a general one but its effect is most spectacular in the neighbourhood of the Greenberg-Low bound.

NBS-TN-327 **Field 20J, 20C**
CFSTI Prices: HC$0.25 MF$0.50
National Bureau of Standards, Boulder, Colo. Radio Standards Lab.
SIGNIFICANCE OF DIMENSIONALITY IN THE SPIN WAVE THEORY OF FERROMAGNETISM,
by Henry Unruh Jr. 19 Apr 66, 18p
Available from Superintendent of Documents, GPO, Washington, D. C., 20402, $0.20

Descriptors: (*Ferromagnetim, Field theory), (*Nuclear spins, Ferromagnetism), Magnetic properties, Wave functions, Temperature, Operators (Mathematics).

The significance of dimensionality in the magnetic properties of a single domain ferromagnetic system is determined utilizing a new approach to the spin wave theory and a few plausible assumptions. If conditions are such as to produce spontaneous magnetization in a finite temperature range for a specific dimensionality then under the same conditions there exists a finite temperature range for every dimensionality in which spontaneous magnetization occurs. (Author)

NBS-TN-328 **Field 20J, 20C, 20L**
CFSTI Prices: HC$0.25 MF$0.50
National Bureau of Standards, Boulder, Colo. Radio Standards Lab.
SOME PROPERTIES OF THE EIGENFUNCTIONS AND EIGENVALUES INTRODUCED BY BETHE FOR THE LINEAR CHAIN OF ATOMS,
by Henry Unruh Jr. 19 Apr 66, 25p
Available from Superintendent of Documents, GPO, Washington, D. C., 20402, $0.25.

Descriptors: (*Ferromagnetism, Field theory), (*Atomic properties, Special functions (Mathematical)), (*Nuclear spins, Wave functions), Operators (Mathematics), Momentum, Nuclear energy levels, Excitation.

The operations (S exp. 2)Psi and (S exp. plus or minus) Psi, in which Psi is an exact eigenfunction obtained by Bethe for the linear chain of localized spins, are discussed. The above operations are the usual square of the total angular momentum and the raising and lowering operators respectively. The results, valid for an arbitrary number of spin inversions, show, as expected, that all possible states of the system can be achieved by omitting all excitations associated with zero wave number but requiring each state to take all possible orientations in space. (Author)

AD-634 437 **See Field 7D**

AD-634 496 **See Field 20H**

UCRL-14546 **See Field 12A**

20K. SOLID MECHANICS

AD-413 377 **Field 20K**
CFSTI Price: HC$2.60
Virginia Univ., Charlottesville.
AN EXPERIMENTAL INVESTIGATION OF THE INTERNAL FRICTION OF SMALL DIAMETER QUARTZ STRANDS AT LOW FREQUENCIES,
by J. H. Whitelaw. Jul 63, 25p Technical rept.
TR-BRN-7-P
Contract Nonr-3623 (00)
Proj. NR-098-038
Technical rept. on Proj. Squid. Prepared in cooperation with Brown Univ., Providence, R. I.

Descriptors: (*Quartz, Internal friction), (*Internal friction, Quartz), Gases, Temperature, Measurement, Oscillators, Wire, Creep, Viscosimeters.

Identifiers: Squid project.

The extension of the oscillating disk method of measuring the viscosity of gases to temperatures of the order of 1000 C necessitates the use of a suspension wire whose internal friction is considerably less than that found for platinum alloy wires by J. Kestin and J. R. Moszynski. This, together with considerations of creep, thermal expansion and chemical inertness, suggested quartz as a suitable material. This report describes tests which were carried out to determine the internal friction of small diameter quartz strands suited for use in an oscillating disk viscometer. (Author)

AD-461 271 **Field 20K, 11I**
CFSTI Price: HC$3.00
Picatinny Arsenal, Dover, N. J. Plastics and Packaging Lab.
THE FUNDAMENTALS OF MATERIALS RESEARCH. PART I. VISCOELASTICITY,
by Julian L. Davis. Apr 65, 77p Technical rept.
TR-3202

Descriptors: (*Materials, Rheology), (*Rheology, Theory), (*Viscoelasticity, Test methods), Polymers, Stresses, Mathematical models, Continuum mechanics, Elasticity, Matrix algebra, Straw (Mechanics), Equations of motion, Mechanical waves, Nonlinear systems.

This is the first of a series of reports on certain aspects of materials research, emphasizing the field of rheology. The purpose of the series is to provide the worker in the field of rheology with a relatively self-contained systematic account of the various theories involved as a basis for the interpretation of experimental data. This report is essentially devoted to the fundamentals of macroscopic viscoelasticity. Chapter 1 gives an account of the viscoelasticity of discrete Voigt and Maxwell models. Chapter 2 gives an excursion into some general properties of continuous media, emphasizing the two methods of describing such media--the Lagrangian and the Eulerian representations. This leads to the concept of compression ratio by invoking the conservation of mass. Chapter 3 presents those elements of matrix theory necessary to an understanding of 3 Chapter 4 'Three-Dimensional Strain.' Chapter 5 discusses the equations of motion for an isotropic Hookean elastic solid. This information will be used as a basis for the discussion of stress waves in a viscoelastic medium--to be presented as a chapter in a subsequent report, which will be designated Part II. Chapter 6 contains some aspects of the author's theory of nonlinear viscoelasticity. (Author)

AD-634 186 **Field 20K**
CFSTI Prices: HC$2.00 MF$0.50
California Inst. of Tech., Pasadena. Div. of Engineering and Applied Science.
THE EFFECT OF COUPLE-STRESSES ON THE STRESS CONCENTRATION AROUND A CRACK.

Technical rept.,
by Eli Sternberg, and Rokuro Muki. Apr 66, 48p TR-6
Contract Nonr-220 (58)
Proj. NR-064-431

Descriptors: (*Fracture (Mechanics), *Stresses), Elasticity, Strain (Mechanics), Theory.

A solution is obtained, within the linearized couple-stress theory of elastic behavior, to the problem presented by a crack of finite length in a uniform field of transverse tension. The results, which are based on the assumption of plane strain, are discussed in detail and compared with their counterpart in classical elastostatics. (Author)

AD-634 356 **Field 20K**
CFSTI Prices: HC$1.00 MF$0.50
Lehigh Univ., Bethlehem, Pa. Dept. of Applied Mechanics.
ON THE WESTERGAARD METHOD OF CRACK ANALYSIS.
Technical rept.,
by G. C. Sih. Mar 66, 11p TR-1
Contract Nonr-610 (06)
Proj. NR-064 476

Descriptors: (*Fracture (Mechanics), Mathematical analysis), Complex variables, Analysis, Elasticity, Loading (Mechanics).

Identifiers: Westergaard method.

The Westergaard method of crack analysis, published almost thirty years ago, is shown to be invalid for a class of crack problems dealing with the infinite medium with cracks under applied loads at infinity. The necessary modifications of the Westergaard method are derived from the complex potential formulation of Muskhelishvili. The examples of a single line crack in an infinite plate owing to biaxial tension and pure shear are discussed. (Author)

AD-634 357 **Field 20K, 20M**
CFSTI Prices: HC$2.00 MF$0.50
Lehigh Univ., Bethlehem, Pa. Dept. of Applied Mechanics.
THREE-DIMENSIONAL THERMOELASTIC PROBLEMS OF PLANES OF DISCONTINUITIES OR CRACKS IN SOLIDS.
Technical rept.,
by Mumtaz K. Kassir, and George C. Sih. Apr 66, 45p TR-2
Contract Nonr-610 (06)
Proj. NR-064-476

Descriptors: (*Fracture (Mechanics), Elasticity), (*Elasticity, Thermal properties), Stresses, Harmonic analysis, Temperature, Surfaces, Disks, Equations.

Identifiers: Thermoelasticity.

A general formulation of the three-dimensional thermoelastic equations for problems involving planes of discontinuities is presented. Harmonic functions are constructed from which the stresses and displacements may be obtained. The thermoelastic potential for symmetric distribution of temperatures on the crack surfaces is related to Boussinesq's three-dimensional logarithmic potential for a disk in the shape of the crack. Closed form solutions are obtained for the cases of crack surfaces exposed to uniform temperatures and/or temperature gradients. The possibility of extending the Griffith-Irwin theory of fracture to cracks under thermal disturbance is also discussed. (Author)

AD-634 416 **Field 20K**
CFSTI Prices: HC$1.00 MF$0.50
Army Foreign Science and Technology Center, Washington, D. C.
THE REFINEMENT OF THE CLASSICAL FLEXURE THEORY OF ANISOTROPIC PLATES,
by L. A. Agalovyan. Jun 66, 21p FSTC-HT-23-94-66
Proj. 2301-6553
TT-66-61516
Trans. of Akademiya Nauk Armyanskoi SSR, Erevan. Izvestiya. Seriya Fiziko-Matematicheskikh Nauk, v17 n5 1965.

Descriptors: (*Flexural strength, *Sheets), Anisotrophy, Theory, Stresses, Mathematical analysis, USSR.

The flexure theory of anisotropic thin plates is established without using any of the assumptions of the classical flexure theory. The asymptotic integration method allows the splitting of the stressed state solution into a sum of three terms. The first term is determined by the basic iteration process which does not include damping of the boundary stress effects, while the two additional damping-containing terms are supplied by auxiliary process evaluation. The resulting integrals incorporate a sufficient degree of arbitrariness to be able to satisfy all boundary conditions. (Author)

AD-634 433 **Field 20K**
CFSTI Prices: HC$1.00 MF$0.50
Massachusetts Inst. of Tech., Cambridge. Aeroelastic and Structures Research Lab.
BUCKLING OF RADIALLY CONSTRAINED THIN CIRCULAR RINGS UNDER INERTIA LOADING,
by T. H. H. Pian. Feb 66, 19p ASRL-TR-136-1
Grants AF-AFOSR-347-65, AF-AFOSR-347-64
Proj. AF-9782
Task 978201
AFOSR-66-0502

Descriptors: (*Buckling (Mechanics), *Rings), Loading (Mechanics), Inertia, Elasticity, Deformation, Approximation (Mathematics).

This paper presents an approximate solution of the elastic deformation of a thin circular ring which is constrained in a rigid circular boundary and is acted upon by inertia loading along a direction in the plane of the ring. The solution is based on the assumption that the detached region is limited to a small portion of the circumference. The result of the solution is represented by a load-deflection curve which indicates the snap-buckling behavior of the ring. By presenting the results in terms of suitable nondimensional parameters, the behavior of rings of different R/t ratios can be determined from a single curve. The approximate solution compares favorably with the result by exact formulation obtained by Bucciarelli and Pian (AD-622 150) for a thin ring of R/t equal to 100. The predicated snap-buckling load is lower by about 3% when compared with the exact result. (Author)

AD-634 489 **Field 20K**
CFSTI Prices: HC$1.00 MF$0.50
Brown Univ., Providence, R. I. Div. of Applied Mathematics.
POLYNOMIAL APPROXIMATIONS TO FUNCTIONALS IN THE THEORY OF MATERIALS WITH MEMORY.
Technical rept.,
by John S. Lew. May 66, 20p TR-13
Contract Nonr-562 (40)
Proj. NR-064-406

Descriptors: (*Solids, Viscoelasticity), (*Polynomials, Functional analysis), Stresses, Strain (Mechanics), Materials, Mathematical analysis, Functions, Continuum mechanics.

For a material with memory, the functional phi which relates the stress to the strain history may sometimes be usefully approximated by a polynomial in the elements of a space L of linear functionals on the space F of strain histories. This paper extends an earlier result of Chacon and Rivlin (ZAMP, 15:444 (1964)) to prove such approximations possible on all bounded sets in the given topology for F, for all functionals phi uniformly continuous in the weak topology on F defined by L. (Author)

AD-634 515 **Field 20K, 17G**
CFSTI Prices: HC$1.00 MF$0.50
Institute of Modern Languages, Inc., Washington, D. C.
STABILITY OF THE MOTION OF SOME CONTROLLED GYROSCOPIC DEVICES ON A MOBILE BASE,
by V. V. Krementulo. Jun 66, 15p
Contract DA-44-009-AMC-1563 (T)
Proj. DA-1C022001A-012
AERDL-T-1841-66, TT-66-61533
Trans. of Akademiya Nauk SSSR. Izvestiya. Mekhanika, n2 1965.

Descriptors: (*Gyroscopes, Stability), Inertial guidance, Inertial navigation, Instrumentation, Dynamics, Equations of motion, USSR.

The problems of the stability of a spherical gyrovertical with an aerodynamic suspension and of a gyrohorizon compass are investigated in the presence of dissipative forces in the case where V,omega, and H are not constants, constituting certain functions of time.

AD-634 533 **Field 20K**
CFSTI Prices: HC$2.00 MF$0.50
Brown Univ., Providence, R. I. Div. of Applied Mathematics.
THE EXISTENCE OF ONE-DIMENSIONAL STEADY SHOCK WAVES IN NONLINEAR MATERIALS WITH MEMORY.
Technical rept.,
by James M. Greenberg. Apr 66, 51p TR-8
Contract Nonr-562 (40)
Proj. NR-064-406

Descriptors: (*Shock waves, *Viscoelasticity), (*Solids, Viscoelasticity), Nonlinear systems, Motion, Momentum, One-dimensional flow, Functions, Equations, Functional analysis, Continuum mechanics.

The dissertation establishes that for a large class of nonlinear materials with memory it is possible to find one dimensional steady motions which satisfy balance of momentum and exhibit stationary shock waves. (Author)

AD-634 624 **Field 20K**
CFSTI Prices: HC$1.00 MF$0.50
Army Materials Research Agency, Watertown, Mass.
LARGE DEFLECTIONS OF THIN SHELLS OF REVOLUTION,
by John F. Mescall. Jun 66, 14p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Bodies of revolution, Deflection), (*Structural shells, Buckling), Spheres, Loading (Mechanics), Numerical methods + procedures, Stability, Rings, Disks.

A major deficiency in the analysis of the stability of thin shells has been the lack of complete and accurate solutions of the governing equilibrium equations throughout the pre- and post-buckling ranges. The specific advantage of the numerical technique proposed in this paper is that it more completely characterizes these solutions. In particular, it permits development of accurate global solutions which are shown to be continuous throughout the loading history. These solutions are also significant because they reveal that the load-deflection curves obtained from axisymmetric theory are a good deal more complicated than originally assumed. The availability of these complete solutions permits one to make a more informed evaluation of the suitability of the various

stability criteria which have been proposed. (Author)

AD-634 630 Field 20K, 20D
CFSTI Prices: HC$1.00 MF$0.50
Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
HYDRODYNAMIC ELASTIC PLASTIC THEORY AND PLANE SHOCK WAVES IN METALS,
by James C. Pearson. Jun 66, 15p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Shock waves, Propagation), Elasticity, Plasticity, Hydrodynamics, Solid state physics, Metals, Fluids.

For abstract, see T 66 15.

AD-634 635 Field 20K
CFSTI Prices: HC$1.00 MF$0.50
Army Materials Research Agency, Watertown, Mass.
ASYMPTOTIC ANALYSIS OF THE AXISYMMETRIC VIBRATIONS OF SHELLS,
by Edward R. Ross Jr. Jun 66, 15p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Structural shells, Vibration), Asymptotic series, Differential equations, Axially Symmetric flow, Dynamics, Mathematical analysis, Membranes.

The paper describes an attempt to apply asymptotic theory to a class of problems in shell dynamics, namely, finding the solutions for elastic, axisymmetric shells executing simple-harmonic axially symmetric vibrations. The purpose of the investigation is to obtain approximations to the general solutions of the governing system learn about the general properties of these solutions. (Author)

AD-634 648 Field 20K
CFSTI Prices: HC$1.00 MF$0.50
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
THE ELASTIC RESPONSE OF BURIED CYLINDERS IN SAND,
by R. E. Walker, G. E. Albritton, and T. E. Kennedy Jun 66, 15p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Cylindrical bodies, Elasticity), (*Underground structures, Elasticity), Sand, Strain (Mechanics), Soil mechanics, Pressure.

The results of the study indicate that there are certain regimes where the elastic theory could be used to determine the dynamic magnification factors. Further, elastic theory does not appear to be applicable over the entire pressure domain nor does it appear to predict the location of the maximum strain. A majority of the observed phenomena may be explained by the fact that the static transmissibility of the soil increases in higher pressure regions and by the fact that the dynamic transmissibility is higher than the static for the low pressure regions. Both the static and dynamic transmissibilities seem to converge in the higher pressure regions. (Author)

AD-634 656 Field 20K, 13K
CFSTI Prices: HC$1.00 MF$0.50
Watervliet Arsenal, N. Y.
MINIMUM WEIGHT DESIGN FOR COMPOSITE TUBES,
by John E. Zweig, and Michael J. Pascual Jun 66, 15p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Pipes, Design), (*Composite materials, Tubes), Cylindrical bodies, Glass textiles, Metals, Filament wound construction, High-pressure research, Elasticity, Plasticity, Weight.

A thick-walled cylindrical tube consisting of a liner or inner cylinder and a jacket or outer cylinder of dissimilar materials is investigated. The objective is to determine minimum tube weight for entirely elastic response to any required maximum internal working pressure. This is accomplished by optimizing liner and jacket dimensions and the residual stresses resulting from the fabrication process. The results are intended to provide a preliminary guide for the design of tubes using a metallic liner and a composite jacket which may be a fiberglass or similar wrapped filament structure in a suitable matrix. (Author)

AD-634 666 Field 20K, 14B
CFSTI Prices: HC$1.00 MF$0.50
Springfield Armory, Mass.
DYNAMIC LOADING RESEARCH FOR TRANSIENT LOAD APPLICATIONS,
by Hubert H. Cadle. Jun 66, 15p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Loading (Mechanics), Dynamics), Pressure, Tests, Strain gages, Test facilities, Strain (Mechanics), Gun barrels, Combustion, Test methods.

The research and development program has resulted in the establishment of a unique facility for testing materials to determine mechanical properties related to a specific transient load application. Through the use of the strain gage on the inside surface of the test specimen, the first yielding of the test piece subjected to internal pressure can be tetected without fear of error attributed to outside surface yield readings. In addition to this, experimental correlation of inside and outside surface strains can be established. Good pressure simulation was achieved for the particular transient load requirements. (Author)

AD-634 675 Field 20K, 13M
CFSTI Prices: HC$1.00 MF$0.50
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
STATIC AND DYNAMIC TESTS OF BURIED UNREINFORCED CONCRETE ARCHES,
by W. J. Flathau, and G. D. Meyer. Jun 66, 15p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Underground structures, Tests), (*Concrete, Loading (Mechanics)), Captive tests, Dynamics, Soil mechanics, Blast, Nuclear explosions, Structural shells.

The primary objective of the study was to determine the response, to collapse, of buried semicircular, unreinforced concrete fixed-end arches of varying stiffnesses when subjected to both static and dynamic loads.

AD-634 700 Field 20K
CFSTI Prices: HC$2.00 MF$0.50
Brown Univ., Providence, R. I. Div. of Engineering.
IMPACT ON RODS OF NON-LINEAR VISCO-PLASTIC MATERIAL NUMERICAL AND APPROXIMATE SOLUTIONS.
Technical rept.,
by T. C. T. Ting, and P. S. Symonds. May 66, 38p TR-3
Contract DA-19-020-AMC-0077 (R), ARPA Order-71

Descriptors: (*Rods, *plasticity), Impact shock, Numerical analysis, Approximation (Mathematics), Mechanical properties.

A numerical technique is described for the solution of impact on finite rods in which the strain rate is assumed to be a function of stress and strain. Examples are given for the strain rate function taken as a power of the dynamic overstress and the results are compared with available analytic solutions and approximate uniform strain theory. (Author)

AD-634 701 Field 20K
CFSTI Prices: HC$2.00 MF$0.50
Brown Univ., Providence, R. I. Div of Engineering.
AN ANALYSIS OF COMBINED LONGITUDINAL AND TORSIONAL PLASTIC WAVES IN A THIN-WALLED TUBE.
Technical rept.,
by R. J. Clifton. May 66, 30p TR-5
Contract DA-19-020-AMC-0077 (R), ARPA Order-71
Contract SD-86

Descriptors: (*Mechanical waves, Cylindrical bodies), Propagation, Plasticity, Torsion, Mathematical analysis.

This paper presents a one-dimensional rate independent theory of combined longitudinal and torsional plastic wave propagation in a thin-walled cylindrical tube. The tube material is assumed to behave as an isotropic work-hardening, elastic-plastic solid, for which the stress-strain curve in simple tension is a smooth curve, concave toward the strain axis. The resulting equations are shown to yield two wave speeds,c sub f and c sub s, which satisfy the inequalitiesc sub 2 < c sub f < c sub o and c sub s < c sub 2 where csub 2 is the elastic shear wave velocity and c sub o is the elastic bar velocity. The solution is given for combined longitudinal and torsional step loading of a semi-infinite tube, which is initially at rest and either unstressed or statically pre-stressed to arbitrary values of normal stress and shear stress. The solution consists of adjoining centered simple wave solutions and constant state solutions. There are two types of simple wave solutions corresponding to the two wave speedsc sub f and c sub s. The stress paths in stress-space associated with these two types of simple waves form an orthogonal network. (Author)

AD-634 702 Field 20K
CFSTI Prices: HC$2.00 MF$0.50
Brown Univ., Providence, R. I. Div. of Engineering.
DESCRIPTION OF MECHANICAL BEHAVIOR OF INELASTIC SOLIDS.
Technical rept.,
by E. T. Onat. May 66, 28p TR-6
Contract DA-19-020-AMC-0077 (R), ARPA Order-71

Descriptors: (*Mechanical properties, *Solids), Viscoelasticity, Mathematical analysis.

The paper is concerned with the representation of mechanical behavior of non-linear solids with memory. The nature and limitations of integral representation of Frechet are discussed. Definitions of state and state variables, which are based on observable histories, are introduced. These notions give rise to differential equation representation of behavior discussed in the latter part of the paper. (Author)

AD-634 732 **Field 20K**
CFSTI Prices: HC$2.00 MF$0.50
Polytechnic Inst. of Brooklyn, N. Y. Dept. of Aerospace Engineering and Applied Mechanics.
AXISYMMETRIC BUCKLING OF ORTHOTROPIC CIRCULAR PLATES WITH VARIABLE THICKNESS.
Research rept.,
by Sharad A. Patel, and Franklin J. Broth. Jun 66, 29p PIBAL-920
Contract Nonr-839 (40)
Proj. NR-064-427

Descriptors: (*Buckling (Mechanics), Metal plates), Stresses, Loading (Mechanics), Mathematical analysis, Power series.

This report is concerned with the axisymmetric buckling of an orthotropic circular plate having variable thickness. The thickness varies in the radial direction and the plate is subjected to a uniform edge compression. The governing equation for the stress distribution due to this edge compression is derived and solved in terms of a power series in the radial coordinate. With the use of this stress distribution, the equation governing the buckling of the plate is derived. It is solved by Galerkin's method for a clamped plate as well as for a simply-supported plate. Values of the buckling loads thus obtained for a uniform thickness plate agree well with existing results. (Author)

AD-634 745 **Field 20K**
CFSTI Prices: HC$2.00 MF$0.50
Minnesota Univ., Minneapolis. Dept. of Aeronautics and Engineering Mechanics.
FOURIER-TRANSFORM TECHNIQUE FOR MEASURING TERMINATING IMPEDANCES.
Technical rept.,
by R. Plunkett, and L. E. Wittig. 1964, 27p TR-66-4
Contract Nobs-92285

Descriptors: (*Rods, Vibration), (*Integral transforms, Measurement), Loading (Mechanics), Shear stresses, Strain (Mechanics), Frequency, Elasticity, Mechanical waves.

The mechanical impedance of a foundation depends, in part, on the characteristics of the column attached to it. For this reason it is important to have a technique to find that mechanical impedance with the column in place; this requirement rules out direct measurement with an impedance head. This study was made to determine the usefulness of a transient loading technique for measuring the mechanical impedance of a complex termination. The method determines the impedance at the end of an elastic bar from the Fourier Transforms of pulse shapes in the bar. Experimental results for a simple termination show that this technique can be used to measure the impedance of a lumped parameter system. However, comparison between transient loading measurements and direct measurements with an impedance head for a more complex termination show that not enough frequency information can be obtained to determine its impedance accurately enough. (Author)

EURAEC-225 **Field 20K**
CFSTI Prices: HC$1.00 MF$0.50
Nijverheidsorganisatie, TNO, The Hague (Netherlands).
THE DEVELOPMENT OF A NEW DETERMINATION OF THE DUCTILE-BRITTLE TRANSITION TEMPERATURE.
Quarterly rept. no. 1, 1 Nov-31 Dec 61,
by C. A. Verbraak. 31 Dec 61, 6p M-61-104
Contract 068-61-11RDN
TT-62-32379

Descriptors: (*Fracture (Mechanics), Photographic analysis), (*Shock waves, Photographic analysis).

For abstract, see T 66 15.

NAA-SR-MEMO-10293 **Field 20K**
CFSTI Prices: HC$3.00 MF$1.00
Atomics International, Canoga Park, Calif.
SHORT CYLINDER ANALYSIS,
by C. C. Rampton. 18 Aug 64, 98p
Contract AT-11-1-GEN-8

Descriptors: (*Cylindrical bodies, Loading (Mechanics)), (*Loading (Mechanics), Structural shells).

N66-14576 **Field 20K**
CFSTI Prices: HC$3.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
STIFFNESS MATRIX STRUCTURAL ANALYSIS,
by B. Wada. 31 Oct 65, 55p JPL-TR-32-774
Contract NAS7-100
NASA-CR-68998

Descriptors: *Structural dynamics, *Computer program, *Degree of freedom, *Stiff structure.

N66-15249 **Field 20K**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
FRACTURE MECHANICS OF THROUGH-CRACKED CYLINDRICAL PRESSURE VESSELS,
by R. B. Anderson. 1965, 26p NASA-TM-X-54980
Presented at the Western Metal Congr., Los Angeles, Feb 22-26 1965, sponsored by the Am. Soc. for Metals.

Descriptors: *Cylindrical tank, *Fracture mechanics, *Pressure vessel, *Crack.

N66-16071 **Field 20K**
CFSTI Prices: HC$3.00 MF$0.50
Drexel Inst. of Tech., Philadelphia, Pa.
FLEXURAL WAVES IN ELASTIC CIRCULAR PLATES BY METHOD OF CHARACTERISTICS.
Final rept.
by P. C. Chou, and H. A. Koening. Aug 65, 58p
DIT-160-6
Grant NsG-270-63
NASA-CR-69703

Descriptors: *Hyperbolic equation, *Impact load, *Structural dynamics, *Elastic plate.

N66-16079 **Field 20K**
CFSTI Prices: HC$1.00 MF$0.50
Michigan Univ., Ann Arbor. Dept. of Engineering Mechanics.
THE DYNAMIC STIFFNESS OF A PNEUMATIC TIRE MODEL,
by R. N. Dodge. 1965, 12p
Grant NsG-344
NASA-CR-69706
Presented at SAE Mid-Year Meeting, Chicago, May 17-21 1965.

Descriptors: *Dynamic response, *Rotating cylinder, *Tire, *Elastodynamics, *Load test.

N66-16384 **Field 20K**
CFSTI Prices: HC$3.00 MF$0.75
Lockheed Missiles and Space Co., Sunnyvale, Calif.
JUNCTURE STRESS FIELDS IN MULTICELLULAR SHELL STRUCTURES. VOLUME VII. BUCKLING ANALYSIS OF SEGMENTAL ORTHOTROPIC CYLINDERS UNDER UNIFORM STRESS DISTRIBUTION.
Final rept.
by B. O. Almroth, E. V. Pittner, and L. H. Sobel. Jul 65, 85p LMSC-M-77-65-3
Contract NAS8-11480
NASA-CR-69870

Descriptors: *Curved panel, *Axial load, *Compression buckling, *Orthotropic cylinder.

PB-169 081 **Field 20K, 20B**
CFSTI Prices: HC$2.00 MF$0.75
Pomona Colla., Claremont, Calif.
THE MECHANICAL ANISOTROPY OF SOLIDS DURING DEFORMATION,
by Gerhard Oertel, Peter Collas, and Don J. Latham. 1960, 44p
Grant NSF-G-9391

Descriptors: (*Structural geology, Fracture (Mechanics)), (*Anisotropy, Solids), (*Clay, Anisotropy), Deformation, Models (Simulations), Shear stresses, Elasticity, Stresses, Rock (Geology).

Most joints, small scale faults, and some penetrative planar structures in rocks are due to shearing movements. Very often systems of these shearing structures do not conform to the patterns expected in ideally, or almost ideally, elastic and isotropic bodies. Wet clay is the most suitable material for reproducing at a small scale ins space and time the fracture patterns that are found in rocks. Clay was deformed and during deformation the strain, the stress and the travel-time of sound were measured either continuously or at short time intervals. The results of the measurements are: (1) Clay paste turns anisotropic beyond the degree of anisotropy that can be expected from preferred orientation of particles. (2) This anisotropy is manifest in the development of the stress with time and in the travel-time of sound waves in the principal directions of the experimental clay cake. (3) At the moment of first appearance of shear fractures the proportions of the magnitudes of the three principal normal components of an anisotropic shear-modulus tensor of second rank can be deduced. This result needs confirmation by further analysis.

PB-169 656 **Field 20K**
CFSTI Prices: HC$3.00 MF$0.75
Illinois Univ., Urbana. Dept. of Civil Engineering.
THE ANALYSIS OF SHALLOW SHELL STRUCTURES BY A DISCRETE ELEMENT SYSTEM.
Structural research series on Civil Engineering Studies,
by B. Mohraz, and W. C. Schnobrich. Mar 66, 89p
Rept. no. SRS-304
Grant NSF-GK-538

Descriptors: (*Structural shells, Mathematical analysis), Loading (Mechanics), Strain (Mechanics), Rods, Models (Simulations), Shear stresses.

The discrete model can be used to analyze a variety of shallow shells. The model gives good estimates of the magnitude and the distribution of deflections and stresses in shells with different edge conditions, different types of loading, and different values of Poisson's ratio. The comparisons of results indicate that the model can be used to study the behavior of shells of different Gaussian curvatures. It the effect of edge disturbances in shells. Rapid variations in forces and moments through the shell can be predicted by the model, however, for better results larger number of spacings should be used. In general, the obta are sufficiently accurate for design purposes. (Author)

AD-476 515 **See Field 21I**

AD-476 735 **See Field 21I**

AD-634 187 **See Field 6B**

AD-634 227 **See Field 13J**

AD-634 364 **See Field 12A**

AD-634 678 **See Field 8M**

PB-169 974 **See Field 13J**

TID-22424 See Field 11F

UCRL-14599 See Field 18J

UCRL-16514 See Field 7D

20L. SOLID STATE PHYSICS

AD-274 516 Field 20L
CFSTI Price: HC$1.00
Eagle-Picher Research Labs., Miami, Okla. Chemical and Metals Div.
RESEARCH INVESTIGATIONS IN THE PHYSICAL CHEMISTRY AND METALLURGY OF SEMICONDUCTING MATERIALS.
Quaterly rept. no. 7, 15 Nov 61-15 Fe b 62,
by K. E. Bean, J. T. Buford, R. J. Starks, and L. E. Stone. 15 Feb 62, 21p
Contract DA-36-039-sc-85131

Descriptors: (*Semiconductors, Boron), (*Boron, Semiconductors), Synthesis (Chemistry), Crystal growth, Doping, Carbon, Silicon, Tungsten.

The synthesis and purification steps remain essentially unchanged from those used during the preceding quarter of this contract period. These steps yield a boron product with a very small silicon content as the only impurity detectable by emission spectrographic analysis. The carbon content is reduced by employing a 500C reaction step during the distillation of the boron tribromide. The carbon content can be further reduced to a value below the detection limits of the presently employed analysis technique by a selective oxidation reaction while the boron is molten. A doping study has been started that has produced n-type boron doped with silicon and n-type boron doped with tungsten. In each case the dopant required was greater than 4x10 to the 20th power atoms per cubic centimeter. P-N junctions have been produced by a meltback technique and by diffusion. Junctions formed by diffusion were obtained by heating the boron in the presence of molybdenum trioxide at a temperature of 800C. (Author)

AD-421 573 Field 20L, 20C, 7D
CFSTI Price: HC$9.60
Westinghouse Research Labs., Pittsburgh, Pa.
THEORETICAL QUARTERLY PROGRESS REPORTS, SEPTEMBER 1962, DECEMBER 1962, AND MARCH 1963.
1963, 97p
Contract NObs-84687

Descriptors: (*Thermoelectricity, Materials), (*Crystals, Thermoelectricity), (*Tellurides, Electrochemistry), Ions, Magnetic fields, Trransport properties, Solutions.

Recently there has been an increasing interest in the effect of a magnetic field on the performance of thermoelectric devices. There are two separate types of devices which must be considered: (1) an ordinary thermoelectric device based upon the Seebeck and Peltier effects; and (2) the Nernst and Ettingshausen effects, which are zero in zero magnetic field, can be used to pump heat or generate power when a magnetic field is present. The theory of materials for thermoelectric devices in zero magnetic field is reviewed and the theory for the magnetic field case is developed. In crystalline materials in which the transport properties are different in different directions, the thermoelectric figure of merit will be a function of the orientation of the crystal. Under certain general conditions it can be shown that the direction of maximum figure of merit will lie along one of the major axes of the crystal. It is shown that the direction of maximum figure of merit depends upon the shape of the specimen. A study of the way in which the Te ion goes into solution is reported. (Author)

AD-458 541 Field 20L, 9A, 11B
CFSTI Prices: HC$3.00 MF$0.75
Arizona State Univ., Tempe.
OXIDE SEMICONDUCTOR MATERIALS AND DEVICE RESEARCH.
Rept. no. 12 (Final), 18 Jan 62-17 Nov 64,
by F. L. English, C. J. Kevane, J. J. Morrison, B. M. Warmkessel, and H. B. Whitehurst. 17 Nov 64, 88p
Contract DA-36-039-sc-89151
Task 1P6-22001-A-056
N65-20904

Descriptors: (*Rutile, Semiconductors), (*Semiconductors, Rutile), (*Diodes (Semiconductor), Rutile), Ceramic materials, Oxides, Semiconductor devices, Titanium compounds, Electrical properties.

A study of the electrical properties of semiconducting ceramic rutile is reported, and the mechanism of rectification observed in some of the devices prepared from the material discussed. Methods of preparing the semiconducting ceramic are also presented. Main effort was expended on preparation and measurement of ceramics made from pure titanium oxide, or from titanium oxide with small amounts of other cations added. A method of preparing the ceramic by the slow dehydration of precipitated titanium dioxide was developed. It was concluded that the rectifying diodes formed from semiconducting ceramic rutile may have limited use at room temperature due to the rather high forward resistance observed to result from the use of insulating layers thick enough to provide adequate reverse breakdown voltages. (Author)

AD-464 777 Field 20L, 9A
CFSTI Price: HC$2.25
Redstone Scientific Information Center, Redstone Arsenal, Ala.
SILICON CARBIDE FOR SEMICONDUCTORS,
by Gus J. Caras. 26 Feb 65, 200p RSIC-381
Prepared in cooperation with National Aeronautics and Space Admin., Geo. C. Marshall Space Flight Center, Huntsville, Ala.

Descriptors: (*Silicon compounds, Carbides), (*Carbides, Semiconductors), (*Semiconductors, Materials), State-of-the-art reviews, Single crystals, Crystal growth, Impurities, Purification, Sublimation, Physical properties, Semiconductor devices, Transistors, Diodes (Semiconductor), Production, Bibliographies.

Identifiers: Silicon carbides.

This state-of-the-art survey on silicon carbide for semiconductors includes a bibliography of the most important references published as of the end of 1964. The various methods used for growing silicon carbide single crystals are reviewed, as well as their properties and devices fabricated from them. The fact that the state-of-the-art of silicon carbide semiconductors is not further advanced may be attributed to the difficulties of growing single crystals of sufficient size and purity for semiconductor applications. Of the various methods of growing silicon carbide, growth by sublimation appears to be the most successful method. There is considerable variation in the properties of silicon carbide as reported in the literature, mainly because most measurements were conducted on crystals with varying amounts and types of impurities. In the area of devices, rectifiers capable of 500C operation and unipolar transistors exhibiting power gain at temperatures greater than 500C have been fabricated. Other devices which have received attention include diodes, photoelectric and electroluminescent devices, and electron emission components. (Author)

AD-471 647 Field 20L, 9B
CFSTI Prices: HC$2.75 MF$1.50
Battelle Memorial Inst., Columbus, Ohio.
THE EFFECTS OF GAS OCCLUSIONS AND STRAINS ON THE MAGNETIC PROPERTIES OF THIN PERMALLOY FILMS.
Rept. for 1955 to Jun 65,
by B. J. Nicholson, G. B. Gaines, J. B. Baker, and G. A. Stark. 28 May 65, 274p
Contract DA-01-021-AMC-11706 (Z)
RSIC-416
Supported in part by National Aeronautics and Space Admin. Geo. C. Marshall Space Flight Center, Huntsville, Ala.

Descriptors: (*Thin films (Storage devices), Magnetic properties), (*Metal films, Magnetic properties), Nickel alloys, Iron alloys, Surfaces, Contamination, Strain (Mechanics), Single crystals, Epitaxial growth, Vapor plating, State-of-the-art reviews, Bibliographies.

Identifiers: Permalloy.

The report comprises a selective survey of the present state of knowledge concerning the effects of occluded gases and strains on the magnetic properties of Permalloy films. Emphasis is directed towards evaluating and understanding those particular magnetic properties which have significance for computer switching applications. Following a short review of other possible techniques for accomplishing future computer switching functions, magnetic films properties are specifically reviewed. Pertinent bulk properties are described and used as a comparison for the corresponding thin film properties. The magnetic properties of epitaxial Permalloy, epitaxial nickel, epitaxial iron, polycrystalline nickel, and polycrystalline iron films are described when it is considered probable that by doing so, assistance is given to an understanding of Permalloy properties. The effects of various occluded gases on magnetic film properties are summarized; some of this information pertains to Permalloy and some to iron and nickel only. Finally, a review is given of stresses present in evaporated films and of their significance in determining the magnetic properties of thin films. The report has a selected annotated bibliography of 548 references. (Author)

AD-634 345 Field 20L, 11F
CFSTI Prices: HC$1.00 MF$0.50
Massachusetts Inst. of Tech., Cambridge.
RELAXATION PHENOMENA AT HIGH ELECTRIC FIELD ON THE SURFACES OF INDIUM ANTIMONIDE.
Technical rept.,
by Howard Huff, and Shinji Kawaji. May 66, 10p
TR-5
Contract Nonr-3963 (05)
Proj. NR-032-482

Descriptors: (*Intermetallic compounds, Semiconductors), (*Indium alloys, Antimony alloys), (*Tunneling (Electronics), Semiconductors), Electric fields, Films, Surfaces, Relaxation time, Band theory of solids.

Identifiers: Indium antimonide.

It was found that high transverse pulsed electric fields applied to indium antimonide surfaces brought about tunneling currents which are extracted through a surface film to the semiconductor bulk. A slow surface state has been located approximately 0.06 eV below the conduction band edge on the (111) A surface of n-InSb. (Author)

AD-634 398 Field 20L
CFSTI Prices: HC$2.00 MF$0.50
RCA Labs., Princeton, N. J.
INVESTIGATION OF TWO-CARRIER INJECTION ELECTROLUMINESCENCE.
Scientific rept. no. 4, 15 Jul 65-15 Feb 66,
by Albert G. Fischer, and William H. Fonger. 14 Mar 66, 37p
Contract AF 19 (628)-3866
Proj. AF-4608
Task 460805
AFCRL-66-226

Descriptors: (*Semiconductors, *Electroluminescence), Carriers (Semiconductors), Photons, Electrolysis, Doping, Single crystals, Zinc compounds, Sulfides, Selenides, Tellurides, Epitaxial growth, Crystal growth, Luminescence, Solvents, Iodine, Neodymium, Phosphorus, Line spectrum.

Identifiers: Zinc selenide, Zinc sulfide, Zinc telluride.

Work on the crucial problem of II-VI p-n injection electroluminescence, suppression of self-compensation, was actively pursued. Experiments on photo-uncompensation and on electrolytical vacancy extraction have been inconclusive so far. Work on two new approaches, ion implantation doping and vacancy suppression by very high hydrostatic pressure, was started. The technique to render ZnS, ZnSe, and ZnTe crystals n-type is described in detail. Progress was made in the field of II-VI crystal growth: Epitaxial layers of ZnSe-x Te-1-x were grown on n-type ZnSe single-crystal substrates by vapor transport in an open-flow system. Large ZnTe:I crystals were grown in sealed evacuated ampoules of a novel design in a furnace permitting visual inspection. A new class of solvents for solution growth of II-VI crystals was discovered, the group V chalcogenides. Photoluminescent narrow-line emission in neodymium-doped ZnSe-x Te-1-x is intensified by coactivation with phosphorus. The spectra and their dependence on various parameters were analyzed. (Author)

AD-634 426 **Field 20L, 9A**
CFSTI Prices: HC$1.00 MF$0.50
Army Foreign Science and Technology Center, Washington, D. C.
IS AN AMPLIFIER REALIZABLE WHICH USES THE NEGATIVE MASSES OF SEMICONDUCTOR HOLES,
by L. B. Lytvak-Gorska, E. M. Gershenzon, and Yu. O. Gurvych. Jun 66, 12p FSTC-HT-23-75-66
Proj. 2301-6553
TT-66-61517
Trans. of Ukrainskyi Fizychnyi Zhurnal (USSR) v9 n9 p948-55 1964.

Descriptors: (*Semiconductor devices, *Amplifiers), (*Carriers (Semiconductors), Amplifiers), Germanium, Silicon, Electrical conductance, Electric fields, Anisotropy.

Identifiers: Nemags.

The quantity of negative effective mass carriers (holes) in Ge and Si is insufficient to realize a negative mass amplifier. A strong electric field acting on Ge at the temperature of liquid nitrogen induces anisotropic conductivity in this material. This anisotropy does not depend on orientation of field in relation to the crystal axes. This indicates that negative mass carriers have slight effect on the anisotropy. (Author)

AD-634 481 **Field 20L**
CFSTI Prices: HC$3.00 MF$0.75
Cornell Univ., Ithaca, N. Y. Lab. of Atomic and Solid State Physics.
DETERMINATION OF KAPPA-1 (T) AND KAPPA-2 (T) FOR TYPE TWO SUPERCONDUCTORS WITH ARBITRARY IMPURITY CONCENTRATION.
Technical rept.,
by Gert Eilenberger. May 66, 72p TR-15
Contract Nonr-401 (38)

Descriptors: (*Superconductors, Mathematical analysis), Equations, Matrix algebra, Thermodynamics, Temperature, Impurities, Crystal lattices, Scattering, Green's function, Magnetic fields, Special function (Mathematical).

Formulas are derived for the constants kappa-1 and kappa-2 of superconducting alloys for arbitrary temperatures and impurity concentrations. Beginning with Gorkov's equations in matrix-form, the free energy density is calculated using Abrikosov's assumption of a fluxoid lattice. The impurities are treated by the usual averaging technique, retaining only s-and p-scattering, and a special technique is developed to treat exactly the non-vanishing commutator of different components of the gauge invariant derivative. The results contain the already known limiting cases. Intermediate values are obtained by performing machine calculations using the general formulas developed here. It is found that the values of kappa-1 and kappa-2 drop relatively strongly even for small impurity concentration, and also depend unexpectedly strongly on the ratio of s-and p-scattering. The recent result of Cyrot, Caroli and de Gennes is confirmed according to which kappa-2 is approximately equal to kappa-1 in the dirty limit. (Author)

AD-634 486 **Field 20L**
CFSTI Prices: HC$3.00 MF$0.75
Navy Electronics Lab., San Diego, Calif.
LOCAL ORDER FOR TERNARY MATERIALS IN A CRYSTAL.
Research and development rept. Jun 65-Jan 66,
by D. O. Christy. 9 Mar 66, 71p NEL-1361
Proj. SR-011-01-01
Task 0401

Descriptors: (*Crystal lattices, Mathematical models), (*Alloys, Mathematical models), Programming (Computers), Atoms, Statistical functions, Scattering, Matrix algebra, Quantum statistics.

The coding technique for describing order in a binary material (Phys. Rev. v104 p350 1956) is extended to describe a ternary substitutional material. The coding is so constructed that in the limit as the third component becomes small, the ternary-order parameters approach the Warren-Cowley binary-order parameters. Bounding values developed for the various-order parameters result from geometrical considerations. The number of each kind of pairs must be non-negative. The Schwarz inequality technique must be applicable to the coding function. A simple scattering problem using the order parameters is presented. An experimental approach to measuring the order parameters is suggested. (Author)

AD-634 488 **Field 20L**
CFSTI Prices: HC$1.00 MF$0.50
Rensselaer Polytechnic Inst., Troy, N. Y.
INVESTIGATION OF TRANSIENT RADIATION DAMAGE IN SEMICONDUCTOR MATERIALS.
Quarterly progress rept. no. 2, 1 Jan-31 Mar 66,
by John C. Corelli, A. Robb Frederickson, and James W. Westhead. Jun 66, 25p
Contract DA-28-043-AMC-01788 (E)
Task NWER-16.0091
ECOM-01788-2
See also AD-632 458.

Descriptors: (*Semiconductors, *Radiation damage), (*Silicon, Transients), Electron bombardment, Resistance (Electronics), Hall effect, Phosphorus, Boron, Ionization, Carriers (Semiconductors), Atomic energy levels.

Transient radiation effects induced in silicon irradiated at 122K and 300K by pulses of 48 MeV electrons were studied using the transient response of resistivity and Hall effect voltages as the measuring probes. Results are given for one ohm-cm phosphorus-doped n-type silicon and a 100 ohm-cm boron-doped p-type sample. In the case of one ohm-cm silicon the results clearly show the actual buildup of excess electrons produced by ionization during the time the electron pulse is irradiating the sample. Moreover, the shape of the pulse during buildup is independent of temperature so long as the electron beam pulse is kept constant. Dependence of the number of injected excess carriers on the ionization intensity (total integrated electron flux in the pulse) was found to be linear up to excess carrier concentrations of 10 to the 17th power/cu.cm. The lifetime is found to increase linearly with injection implying that the recombination may be dominated by one defect energy level. The significant 'damage mechanism' can be understood by considering only the transient ionization effects, since atomic displacements effects are small and insignificant. (Author)

AD-634 528 **Field 20L, 10A, 11B**
CFSTI Prices: HC$2.00 MF$0.50
Franklin Inst. Research Labs., Philadelphia, Pa.
STUDY OF TRANSPORT PROPERTIES OF REFRACTORY SEMICONDUCTING COMPOUNDS.
Final rept.
Apr 65, 43p F-B1961
Contract NObs-86800
Proj. SR-007-12-01
Task 806

Descriptors: (*Refractory materials, Transport properties), (*Semiconductors, Transport properties), (*Thermionic convertors, Materials), Crystal lattices, Atomic orbitals, Carriers (Semiconductors), Thermoelectric effect, Molybdenum compounds, Chromium compounds, Silicides, Germanium compounds, M/lybdenum alloys, Silicon alloys, Germanium alloys, Chromium alloys, Intermetallic compounds.

The original scope and objective of the program was a theoretical and experimental study of the transport properties of refractory semiconducting compounds which might offer promise as thermoelectric generator materials at fairly high temperatures (up to at least 500C). The report consists of: (1) a detailed treatment of the phenomenological theory of various galvano-thermomagnetic effects in crystalline media (including an extensive compilation of the forms of the various pertinent tensors for the thirty-two crystal classes); (2) a brief and qualitative discussion of the electronic structure of MA sub 2-x B sub x-type compounds (M = transition metal, A and B are similar elements from the same column of the periodic table); (3) a description of the experimental work carried out on this project, including a summary of the room-temperature measurements of thermoelectric power and electrical conductivity for the systems MoSi sub 2-x Ge sub x and CrSi2.

AD-634 558 **Field 20L**
CFSTI Prices: HC$2.00 MF$0.50
Aerospace Research Labs., Office of Aerospace Research, Wright-Patterson AFB, Ohio.
ENHANCED SURFACE LAYER DIFFUSION IN NON-METALLIC COMPOUNDS.
Scientific rept.,
by Henry C. Graham, and Norman M. Tallan.
Mar 66, 29p ARL-66-0058
Proj. AF-7021

Descriptors: (*Non-metals, *Diffusion), (*Crystal lattice defects, Diffusion), Reviews, Halides, Oxides, Electrical conductance, Sodium compounds, Chlorides, Aluminum compounds, Oxides, Grain boundaries, Space charge.

Identifiers: Aluminum oxides, Sodium chloride.

The literature on the subject of enhanced surface layer diffusion in non-metallic compounds is critically reviewed. It is concluded that the enhancement results from an increase in the pre-exponential factor and that the diffusion mechanism is the same in both the bulk material and in the sub-surface layer. The space charge treatment of Lehovec is presented as the most fruitful source of a theoretical explanation, but it is also established that additional theoretical and experimental work must be undertaken to find the source of the observed increase in the pre-exponential factor of the diffusion coefficient. It is further concluded that, in general, dislocations do not contribte significantly to the enhanced diffusion in the sub-surface layer. Possible practical applicatiuons of the enhancement phenomenon are also presented. (Author)

AD-634 579 **Field 20L**
Illinois Univ., Urbana. Materials Research Lab.
ENERGY LEVELS AND NEGATIVE PHOTOCONDUCTIVITY IN COBALT-DOPED SILICON,
by Claude M. Penchina, J. S. Moore, and N. Holonyak Jr. 1 Sep 65, 5p

Contract SD-131, Grant AF-AFOSR-714-65
AFOSR-66-0985
Contract AF 19 (628)-4337.

Descriptors: (*Silicon, *Doping), (*Cobalt, Semiconductors), (*Atomic energy levels, Cobalt), (*Photoconductivity, Cobalt), Band theory of solids, Hall effect, Temperature, Resistance (Electrical).

Some effects of cobalt doping on n-type silicon were studied. Two deep acceptor levels were found; the upper one 0.53 eV from the conduction band and the lower one 0.35 eV from the valence band. This double-acceptor behavior leads to extrinsic negative photoconductivity. The spectral response, frequency response, and temperature dependence of this negative photoconductivity are reported. (Author)

AD-634 584 **Field 20L**
Pennsylvania State Univ., University Park. Dept. of Physics.
MINORITY-CARRIER MOBILITY IN p-TYPE GERMANIUM UNDER HIGH UNIAXIAL STRESS,
by M. W. Cresswell, and J. P. McKelvey. 12 Nov 65, 7p
Grant AF-AFOSR-73-66
AFOSR-66-0984

Descriptors: (*Germanium, *Carriers (Semiconductors)), Stresses, Single crystals, Impurities, Indium, Electric currents, Compressive properties, Scattering, Band theory of solids.

The minority-carrier drift mobility in a single crystal of germanium containing 3x10 to the 15th power indium atoms per cc was measured as a function of uniaxial compression in a lattice (111) direction at room temperature by observing directly the drift of an excess carrier concentration under the influence of an applied electric field. The maximum fractional change in length of the crystal cut in the shape of a rod, was 0.99%, corresponding to a compressive pressure of approximately 1.5x10 to the 10th power dyn/sq. cm, sufficiently high to transfer substantially all conduction electrons to a single valley. A comparison of the experimental data with theoretical estimates of mobility variation due to strain-induced population transfer in the conduction band yielded a value for the scattering anistropy of 3.7 plus or minus 0.3. This value is considerably higher than that obtained from studies of magnetoresistance of n-type germanium, the difference in the results being attributed to electron-hole scattering in the excess-carrier-drift mobility measurements. (Author)

AD-634 591 **Field 20L, 20B**
CFSTI Prices: HC$2.00 MF$0.50
Eagle-Picher Industries, Inc., Miami, Okla. Miami Research Labs.
RESEARCH IN PURIFICATION AND SINGLE CRYSTAL GROWTH OF II-VI COMPOUNDS.
Quarterly progress rept. no. 4, 15 Jan-14 Apr 66,
by R. H. Fahrig, L. W. Brown, and G. N. Webb. 14 Apr 66, 26p
Contract AF 33 (615)-2947
See also AD-470 918.

Descriptors: (*Single crystals, Semiconductors), (*Semiconductors, Single crystals), (*Crystal growth, Single crystals), Sulfides, Selenides, Tellurides, Impurities, Synthesis (Chemistry), Purification, Laboratory furnaces, Semiconductors, Zinc alloys, Cadmium alloys, Selenium alloys, Tellurium alloys, Cadmium compounds, Zinc compounds, Intermetallic compounds.

Identifiers: Cadmium sulfide, Zinc selenide, Cadmium telluride.

A study was made of the factors influencing the synthesis, purity, and crystallization of Group II-VI compound semiconductor materials. Synthesis operations were limited to CdS, ZnSe and CdTe. A milestone in purity was reached in CdS lot 274 when only 325 parts per billion total impurities were found by mass spectrographic analysis. Purities in general were believed to be somewhat better than usual although this cannot be supported by the emission spectrographic data received. Crystals of CdS, ZnS, CdTe, and ZnSe were grown from the melt. Mixed crystals of CdZnS, ZnSeTe, and ZnCdSe were also grown. Tests of the controller and programmer for the new pressure furnace system were concluded. The units functioned as anticipated and demonstrated that crystals grown using this apparatus are superior in appearance to ones grown by manual control. Also tested was the cover for the new pressure furnace. The successful completion of the tests on this item cleared the way for hardening of the furnace design and proceeding with the construction. The autoclave purchased for the hydrothermal growth of crystals was setup and tested. Crystal growth will be started at once. (Author)

AD-634 645 **Field 20L, 7E, 7D, 20B K**
CFSTI Prices: HC$1.00 MF$0.50
Picatinny Arsenal, Dover, N. J. Explosives Lab.
THERMOLUMINESCENCE IN POTASSIUM AZIDE,
by Peter D. Townsend, and Paul W. Levy. Jun 66, 14p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Azides, Luminescence), Potassium compounds, Heat of activation, Color centers, Crystal lattice defects, X rays, Heating, Ultraviolet radiation, Gamma rays, Electron spin resonance.

Identifiers: Potassium azide.

The present work has extended the range of thermoluminescence measurements from a lower limit of 77K to 10K and has amplified the earlier work to include such effects as the dose dependence of the luminescence signal, measurement of the activation energy of the glow peaks, and the production of additional glow peaks in doped azide powders. There is no simple correlation between the thermoluminescence and the gas evolution, and the detailed study of the glow peaks at various heating rates showed that a comparison of the glow peaks and gas evolution could lead to error if one chose a single heating rate which caused the maxima to occur at a similar temperature. Measurements at several heating rates have shown that the two processes do not proceed at the same time. (Author)

AD-634 725 **Field 20L, 20C**
CFSTI Prices: HC$1.00 MF$0.50
Forsvarets Forskningsinstitutt, Kjeller (Norway).
CURRENT OSCILLATION AND SATURATION IN CADMIUM SULPHIDE,
by L. O. Svaasand. 17 Jan 66, 11p Scientific-12, Intern-Rapport-E-76
Contract AF-61 (052)-484
AFCRL-66-432

Descriptors: (*Cadmium compounds, Sulfides), (*Sulfides, Electrical properties), Electric currents, Oscillation, Acoustic properties, Voltage, Norway.

Identifiers: Cadmium sulfide.

Experiments were performed in order to explain the observed double current saturation in CdS. The phenomenon appears to be caused by simultaneous acoustic oscillation in a shear mode and a longitudinal mode. Current oscillations in the 25 - 35 MHz range were also observed but no adequate explanation can be given. (Author)

NYO-2994-3 **Field 20L**
CFSTI Prices: HC$3.00 MF$0.50
Franklin Inst., Labs. for Research and Development, Philadelphia, Pa.
SURFACE DIFFUSION STUDIES,
by J. B. Drew, and J. J. Pye. Mar 64, 55p F-B1979-3

Descriptors: (*Diffusion, Tracer studies), (*Metallic crystals, Diffusion).

For abstract, see T 66 15.

N66-15321 **Field 20L**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
CURRENT DISTRIBUTION IN AN ARRAY OF SUPERCONDUCTING THIN FILMS,
by A. R. Sass, J. H. Simmons, and I. D. Skurnick. 1965, 18p NASA-TM-X-52080
Presented at the Intern. Conf. on Nonlinear Magnetics (3rd), IEEE, Washington, D. C., Apr 21-23 1965.

Descriptors: *Integral equation, *Superconductivity, *Thin film, *Current distribution.

ORNL-3935 **Field 20L**
CFSTI Prices: HC$3.00 MF$0.75
Oak Ridge National Lab., Tenn.
SOLID-STATE DIVISION ANNUAL PROGRESS REPORT FOR PERIOD ENDING DECEMBER 31, 1965.
Apr 66, 82p
Contract W-7405-eng-26

Descriptors: (*Solid state physics, Reports), (*Metallic crystals, Radiation damage).

AD-404 819 **See Field 9A**

AD-419 846 **See Field 20C**

AD-442 635 **See Field 9A**

AD-447 260 **See Field 9A**

AD-469 073 **See Field 11I**

AD-470 376 **See Field 20E**

AD-634 148 **See Field 5A**

AD-634 238 **See Field 11F**

AD-634 445 **See Field 20J**

AD-634 524 **See Field 11B**

AD-634 539 **See Field 9A**

AD-634 667 **See Field 20J**

AD-634 684 **See Field 18D**

AD-634 688 **See Field 20E**

AD-634 718 **See Field 18D**

AEC-TR-6520 **See Field 7E**

BNL-944 **See Field 20H**

LA-3471 **See Field 20B**

NBS-TN-328 **See Field 20J**

PB-169 983 **See Field 18D**

UCRL-10969 **See Field 18J**

20M. THERMODYNAMICS

AD-291 200 **Field 20M**
CFSTI Price: HC$9.65
General Dynamics/Astronautics, San Diego, Calif. Space Science Lab.
BLACKBODY RADIATION TABLES,

by Carmine C. Ferriso. 1962, 665p GDA-AE-62-0862

Descriptors: (*Blackbody radiation, Tables), Temperature, Frequency, Functions.

The hemispherical spectral radiant intensity of a blackbody radiator has been evaluated between 1/100,000 cm and 1/5 cm over the temperature range 5K to 10 to the 8th power K. The temperature range 300 to 6000K, in increments of 10K, is given in Table I (300 and 6000K are approximately the earth's and sun's average temperature). In Table II, the temperature region between 5 and 300K is tabulated in intervals of 5K. The region between 6000 and 10,000K is tabulated in increments of 100K; from 10,000 to 100,000K with delta T = 1,000; from 100,000 to 1,000,000K with delta T = 10,000; from 1,000,000 to 10,000,000K with delta T = 100,000; and from 10,000,000 to 100,000,000K with delta T = 1,000,000. On each page the radiance values are tabulated for two particular wavenumbers. The spectral region between 1/100,000 cm and 1/50,000 cm is changed by increments of 1/1000 cm; from 1/50,000 to 1/10,000 cm with delta null-nu = 1/500 cm; from 1/10,000 cm to 1/200 cm with delta null-nu = 1/20 cm; and from 1/200 cm to 1/5 cm with delta null-nu = 1/5 cm.

AD-634 158 **Field 20M**
CFSTI Prices: HC$1.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
A NEW METHOD FOR THE MEASUREMENT OF HEAT TRANSFER.
Technical rept,
by P. H. H. Bishop, K. F. Rogers, and D. M. Gilbey. Feb 66, 23p TR-66040

Descriptors: (*Heat transfer, Measurement), Mathematical analysis, Silicon compounds, Dioxides, Rubber, Thermal conductivity, Great Britain.

Identifiers: Silicon dioxide.

A new method for the determination of heat transfer is proposed, based on the relation: h = -delta P/delta T where delta P is the power required to maintain temperature at one point, following a depression in temperature delta T at another point. The method was applied to the determination of thermal conductivity of standard silica and ebonite specimens, and gave results correct to within a few per cent. For the general measurement of heat transfer, the method may be used to distinguish between heat flows of particular interest and extraneous flows. (Author)

AD-634 232 **Field 20M, 20D**
CFSTI Prices: HC$1.00 MF$0.50
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
HEAT TRANSFER IN THE CASE OF TURBULENT MOTION OF A FLUID IN AN ANNULAR DUCT,
by V. P. Isachenko, and N. M. Galin. 19 May 66, 14p TG-230-T480
Contract NOw-62-0604-c
TT-66-61475
Trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Energetika (USSR) n6 p68-73 1965.

Descriptors: (*Heat transfer, *Ducts), (*Fluid flow, Ducts), Turbulence, Thermal radiation, Hydraulic systems, USSR.

The applicability of formulas for the calculation of heat transfer in circular ducts to non-circular ducts is discussed. The resultant deviation of the heat transfer coefficient, in some instances considerable, are probably due to the effect of the diameter ratio, which takes the variations of temperature and velocity fields in annular ducts into account. To clarify this problem, the average heat transfer in a smooth straight annular duct was investigated for a water flow with water as the secondary heat transfer medium. The results showed that the accuracy of calculations can be improved considerably by applying a correction factor. (Author)

AD-634 256 **Field 20M, 13A**
CFSTI Prices: HC$3.00 MF$0.75
Cryogenic Engineering Lab., Mass. Inst. of Tech., Cambridge.
THE INCEPTION OF NUCLEATE BOILING WITH LIQUID NITROGEN.
Final scientific rept., Jan 65-Jan 66,
by David W. Almgren, and Joseph L. Smith Jr.
Apr 66, 88p
Contract AF 19 (628)-4972
Proj. AF-8608
Task 860801
AFCRL-66-271

Descriptors: (*Liquefied gases, *Nucleate boiling), (*Nitrogen, Nucleate boiling), Coolants, Heat transfers, Thermal conductivity, Bubbles, Enthalpy, Cryogenics, Finishes + finishing, Flame spraying, Copper, Zinc, Electromagnets, Cooling.

Delayed inception of nucleate boiling and patchwise boiling are discussed and the significant parameters restricting the growth of a boiling patch are analytically determined to be: (1) a high nucleate boiling heat transfer coefficient; (2) a low total heat flux; (3) the absence of cavities with a trapped liquid-vapor interface outside the boiling patch; (4) an appropriate value of wall thermal conductivity; (5) a high vapor enthalpy per bubble. A qualitative agreement between theory and experiment was observed for items 1, 2, 3 and 4. A series of pool boiling tests were conducted at one atmosphere of pressure in order to develop a surface finish that would eliminate the observed temperature hysteresis at inception of boiling of liquid nitrogen. The best surface finish developed used a bi-metallic (Zm + Cu) flame spray process. The flame spray and a 0.3-micron-grit polished copper surface were tested for their nucleation properties in forced flow of liquid nitrogen. Visual observations indicated that nucleation occurred promptly on both surfaces at approximately the same wall temperature. (Author)

AD-634 588 **Field 20M, 20D**
CFSTI Prices: HC$5.00 MF$1.00
Tennessee Univ., Knoxville. Dept. of Nuclear Engineering.
FILM AND TRANSPIRATION COOLING OF NOZZLE THROATS.
Technical rept.,
by H. C. Roland, P. F. Pasqua, and P. N. Stevens.
Jun 66, 158p
Contract AF 40 (600)-981
Proj. AF-7778
Task 777805
AEDC-TR-66-88

Descriptors: (*Hypersonic nozzles, Cooling), (*Nozzle throats, Cooling), Evaporation, Film cooling, Injection, Gas flow, Boundary layer.

The following conclusions were drawn: (1) Gas film cooling can be used to measurably lower the wall temperatures and the wall heat fluxes in the converging section and at the throat of a high-pressure high-temperature nozzle. Some gross mixing occurs at the injection point, the exact amount being some as yet undetermined function of the injection geometry, the relative velocities of the main gas stream and the coolant stream at the injection point, and the entering velocity profiles and turbulence conditions. (2) A straightforward boundary layer type analysis was developed and programmed which predicts with reasonable accuracy the nozzle wall temperatures and wall heat fluxes in the converging section and at the throat for gas film cooled nozzles. (3) Calculational techniques were developed and programmed for predicting the effectiveness of liquid film cooling and liquid or gas transpiration cooling in nozzles. These techniques should be checked against experimental data before they are used for design purposes, however. (Author)

LA-3364 **Field 20M, 12A**
CFSTI Prices: HC$3.00 MF$0.50
Los Alamos Scientific Lab., Univ. of California, N. Mex.
CALCULATIONS OF THE THERMAL PROPERTIES OF HYDROGEN,
by B. B. Fisher. 15 Nov 65, 49p
Contract W-7405-eng-36

Descriptors: (*Hydrogen, Thermal analysis), (*Numerical analysis, Thermodynamics).

For abstract, see N 20 13.

LA-3426 **Field 20M, 20D**
CFSTI Prices: HC$1.00 MF$0.50
Los Alamos Scientific Lab., Univ. of California, N. Mex.
COOLDOWN OF CRYOGENIC TRANSFER LINES,
by D. H. Leibenberg. 22 Nov 65, 22p
Contract W-7405-eng-36

Descriptors: (*Two-phase flow, Cryogenics), (*Cryogenics, Liquefied gases).

N66-15248 **Field 20M**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
THE INCIPIENCE OF FLOW OSCILLATIONS IN FORCED-FLOW SUBCOOLED BOILING,
by F. A. Jeglic, and K. T. Yang. 1965, 35p
NASA-TM-X-52081
Presented at the Heat Transfer and Fluid Mech. Inst., Los Angeles, Jun 21-23 1965.

Descriptors: *Boiler, *Oscillating flow, *Phase change, *Subcooling.

N66-16072 **Field 20M**
CFSTI Prices: HC$2.00 MF$0.50
Southern Methodist Univ., Dallas, Tex.
HEAT TRANSFER ACROSS SURFACES IN CONTACT - PRACTICAL EFFECTS OF TRANSIENT TEMPERATURE AND PRESSURE ENVIORNMENTS.
Semiannual rept. Apr 1-Oct 1, 65,
by H. A. Blum. 1965, 42p
Grant NsG-711
NASA-CR-69696

Descriptors: *Contact, *Heat transfer, *Surface.

N66-16378 **Field 20M**
CFSTI Prices: HC$4.00 MF$0.75
Lockheed Missiles and Space Co., Sunnyvale, Calif. Aerospace Sciences Lab.
COUPLED CONVECTIVE AND RADIATIVE HEATING TO SUPERORBITAL ENTRY VEHICLES,
by A. C. Buckingham, and H. Hoshizaki. Oct 65, 104p LMSC-4-43-65-1
Contract NAS7-295
NASA-CR-69869

Descriptors: *Convective heat transfer, *Radiant heating, *Reentry vehicle, *Suborbital flight.

ORNL-3510 **Field 20M, 11F, 13H**
CFSTI Prices: HC$6.00 MF$1.25
Oak Ridge National Lab., Tenn.
THERMAL CONDUCTIVITY OF MAGNESIA, ALUMINA, AND ZIRCONIA POWDERS IN AIR AT ATMOSPHERIC PRESSURE FROM 200 DEG F TO 1500 DEG F.
Doctoral thesis,
by H. W. Godbee. Apr 66, 203p
Contract W-7405-eng-26

Descriptors: (*Powder metals, Thermal conductivity), (*Thermal conductivity, Heat transfer).

For abstract, see N 20 13.

AD-634 135 See Field 7D

AD-634 357 See Field 20K

AD-634 665 See Field 11F

AD-634 767 See Field 20I

NBS-TN-270-2 See Field 7D

PB-169 910 See Field 7D

PB-170 406 See Field 20D

STL-372-14 (1) See Field 20D

20N. WAVE PROPAGATION

AD-416 573 Field 20N, 9B
CFSTI Price: HC$4.60
Stanford Research Inst., Menlo Park, Calif.
FEASIBILITY STUDY OF THE DEVELOPMENT OF A DIGITAL COMPUTER ROUTINE FOR THE SIMULATION OF RADIO FREQUENCY BACKSCATTER FROM SPACE VEHICLES AND OF MATHEMATICAL METHODS FOR ANALYZING DIGITALIZED BACKSCATTER DATA,
by R. C. McCarthy, W. C. Cutler, and G. W. Evans II.Feb 62, 49p Technical rept. TR-1
Contract SD-103, ARPA order-281-62
Proj. SRI-3857

Descriptors: (*Radio waves, Backscattering), Electromagnetic waves, Scattering, Simulation, Digital computers, Space vehicles, Experimental data, Digital systems, Radar signals, Reflection, Functions, Statistical analysis, Sampling, Noise (Radar), Noise (Radio), Programming (Computers), Compilers.

This report describes preliminary analytical investigations required to delineate computer routines for (1) the simulation of RF backscatter from space vehicles and (2) the analysis of digitalized backscatter data. It is the second report prepared by the Mathematical Sciences Department of Stanford Research Institute for project DEFENDER under the present SRI contract with ARPA. Portions of this report are written as an exposition of the analytical methods developed in the previous works of the referenced authors. The report is presented in the interests of continuity and possible applicability to the accomplishment of the outlined objectives. (Author)

AD-454 896 Field 20N
CFSTI Price: HC$32.10
Stanford Research Inst., Menlo Park, Calif.
MEASUREMENTS OF VLF WAVE-FRONT COMPONENTS OVER LONG PATHS.
Final rept.,
by G. S. Parks, Jr, G. H. Price, A. L. Whitson, and H. W. Parker. Mar 64, 325p
Contract NObsr-85271 (FBM)
Proj. SRI-3590

Descriptors: (*Radio waves, Ionospheric propagation), (*Ionospheric propagation, Radio waves), Very low frequency, Electromagnetic fields, Radio fields, Wave functions, Radio equipment, Australia, California.

A receiving system that sampled six components of the received wave front--three orthogonal electric (E) field components and three orthogonal magnetic (H) field components--was operated at Perth, Western Australia. A prototype system was also operated at Tracy, California. Transmissions at VLF from five U.S. Navy stations were monitored and recorded. Data have been processed for several periods between April and August 1963. Theoretical results derived from mode theory calculations are summarized as a basis for comparing the wave-front data with the currently accepted theory of long-distance VLF propagation. An outline of this theory is given in an appendix. The wave-front data are described and discussed. Comparisons of the results of the theoretical calculations and the data demonstrate the limitations of this theory for predicting antipodal effects. Large discrepancies between theory and data are found with regard to the size of the horizontal electric field components, which appear larger than those theoretically calculated. The cause of these discrepancies is not apparent from the material available, but they suggest that abnormal field components may not be negligible. The magnitude of the ratio of major field components, vertical-E to transverse-H, is also found to sometimes depart significantly from the theoretically expected value of 377 ohms. A collection of phase and amplitude plots, obtained by the operation of an auxiliary portion of the receiving system, is included with brief comments. (Author)

AD-634 150 Field 20N
CFSTI Prices: HC$3.00 MF$0.75
Washington Univ., Seattle. Dept. of Electrical Engineering.
SCATTERING OF A SURFACE WAVE FROM AN ABRUPT CHANGE IN THICKNESS ON A DIELECTRIC SLAB.
Interim scientific rept. (Technical),
by William W. Cooley, and Akira Ishimaru. Mar 66, 66p TR-105
Contract AF 19 (628)-2763
Proj. AF-5635
Task 563502
AFCRL-66-249

Descriptors: (*Electromagnetic waves, Propagation), (*Dielectrics, Surface properties), Antenna radiation patterns, Waveguides.

Surface wave scattering is of interest in antenna design and radio propagation. This report obtains an approximate solution for the scattering of a TM surface wave from a step change in thickness on a ground dielectric slab, a problem which can not be solved exactly. The solution is developed from a new integral formula by a technique similar to the Born approximation. An integral formula is developed by applying the divergence theorem to two different problems which are related to the original, but because of their geometry are simpler to solve. This integral formula is then specialized to the two dimensional case for both TE and TM polarizations. The Scattering of a TM surface wave from a step change in thickness on a grounded dielectric slab is determined from an approximate solution of the integral formula. The approximation made is similar to the Born approximation, but different in that two known solutions are used rather than one. Radiation patterns and the total fraction of incident power scattered are calculated for both of the possible directions of incident wave. An equivalent circuit description of the discontinuity is also mentioned. Results of the analysis are compared favorably with previous workers in the special case of an abruptly terminated dielectric slab. Some experimental work is included to support the theoretical development. (Author)

AD-634 240 Field 20N, 8E
CFSTI Prices: HC$4.00 MF$0.75
Ohio State Univ., Columbus. Dept. of Geodetic Science.
EXPECTED INSTRUMENT ACCURACY OF MICROWAVE DISTANCERS,
by Simo H. Laurila. Dec 65, 103p Scientific-18, DGS-64
Contract AF 19 (628)-2771
Proj. AF-7600
Task 760002
AFCRL-66-51

Descriptors: (*Microwaves, Propagation), (*Distance-measuring equipment, *Microwave equipment), Calibration, Radio waves, Humidity, Atmospheric refraction, Surveying, Geodesics, Phase shift, Errors.

Humidity effect in microwave distancers was evaluated and found to cause phase shifting in the cyclic error variation. Cyclic error variation was found to be present in MRA-1, MRA-2 and MRA-3 Tellurometers reaching values up to plus or minus 20 cm. The repetition of measurements at different weather conditions and by extending the line 15 meters with one meter intervals between measurements proved to improve the results essentially in MRA-1 and MRA-2 operations. The extension of the line 10 meters in MRA-3 operations and the use of interchangeable Master/Remote functioning proved to be necessary to obtain the ultimate accuracy. The resolution capability of the MRA-1 and MRA-2 Tellurometers is about plus or minus 2.3 cm, while the allover standard error for one observation is about plus or minus 7.5 cm. The resolution capability of MRA-3 Tellurometer is about PLUS OR MINUS .3 CM AND THE ALLOVER STANDARD ERROR FOR ONE OBSERVATION IS ABOUT PLUS OR MINUS 1.5 CM. The standard error for one observation in Electrotape DM-20 seems to be about plus or minus 0.8 cm. The use of microwave absorbents or reflection plates has been found to reduce the reflection errors from solid or moving objects.

AD-634 297 Field 20N, 20C
CFSTI Prices: HC$3.00 MF$0.75
Ohio State Univ. Research Foundation, Columbus. Antenna Lab.
THE USE OF TRANSIENT AND IMPULSE RESPONSE APPROXIMATIONS IN ELECTROMAGNETIC SCATTERING PROBLEMS.
Interim scientific rept.,
by Edward M. Kennaugh, and David L. Moffatt. 28 Feb 66, 61p Rept. no. 1793-3, Scientific-3
Contract AF 19 (628)-4002
Proj. AF-4600
Task 460004
AFCRL-66-254

Descriptors: (*Electromagnetic waves, Scattering), Transients, Approximation (Mathematics), Electromagnetic fields, Radar reflections, Wave functions, Target discrimination.

General properties of the solutions to transient electromagnetic scattering problems are described. Electromagnetic field waveforms produced by the scattering of transient plane waves from finite objects are related to those produced by an impulsive plane wave. Properties of the impulse response waveforms at great distances from the target, particularly in the backscattering direction, are discussed. Various methods for approximation of impulse response waveforms using time and frequency domain concepts are suggested and illustrated. Other applications of response waveforms to target identification and to prediction of radar echo pulse waveforms are described. (Author)

AD-634 759 Field 20N
CFSTI Prices: HC$2.00 MF$0.50
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
SOLUTION OF APERTURE DISTRIBUTION FOR A GIVEN FIELD PATTERN,
by Donald Vance Cox. Feb 50, 51p Bumblebee-122
Contract NOrd-7386

Descriptors: (*Antenna radiation patterns, *Antenna configurations), Mathematical analysis, Integral equations.

For abstract, see T 66 15.

AD-402 842 See Field 4A

AD-634 148 See Field 5A

AD-634 242 See Field 8C

AD-634 316 See Field 20E

AD-634 358 See Field 4A

AD-634 372 See Field 4A

AD-634 667 See Field 20J

AD-634 729 See Field 4A

AD-634 758 See Field 20C

21B. COMBUSTION AND IGNITION

AD-445 978 Field 21B, 1A
CFSTI Price: HC$12.60
Polytechnic Inst. of Brooklyn, N. Y. Dept. of Aerospace Engineering and Applied Mechanics.
THEORETICAL AND EXPERIMENTAL INVESTIGATION OF SUPERSONIC COMBUSTION,
by Antonio Ferri, Paul A. Libby, and Victor Zakkay. Sep 62, 130p PIBAL-713
Contract AF 49 (638)-217
Proj. AF-9718

Descriptors: (*Combustion, Supersonic flow), Hydrogen, Air, Turbulence, Jets, Fuels.

A theoretical and experimental investigation of mixing and supersonic combustion is presented. A review of the problem under investigation is given. An analysis of inviscid flow fields with a finite rate chemistry for a hydrogen-air reaction is presented. An analysis of a turbulent mixing for flows with large density gradients with no chemical reaction is presented. The analysis is compared with the experimental results. The results of the experiments in supersonic combustion are presented. (Author)

AD-445 978 Field 21B, 7D
CFSTI Price: HC$4.00
Polytechnic Inst. of Brooklyn, N. Y. Dept. of Aerospace Engineering and Applied Mechanics.
THEORETICAL AND EXPERIMENTAL INVESTIGATION OF SUPERSONIC COMBUSTION,
by Antonio Ferri, Paul A. Libby, and Victor Zakkay.Sep 62, 122p PIBAL-713
Contract AF 49 (638)-217
Proj. AF-9781

Descriptors: (*Hydrogen, Combustion), (*Combustion, Supersonic flow), Turbulence, Mathematical analysis, Air, Mixtures, Jets, Fuels, Reaction kinetics.

A theoretical and experimental investigation of mixing and supersonic combustion is presented. A review of the problem under investigation is given. Then an analysis of inviscid flow fields with a finite rate chemistry for a hydrogen-air reaction is presented. An analysis of a turbulent mixing for flows with large density gradients with no chemical reaction is presented. The analysis is compared with the experimental results. The results of the experiments in supersonic combustion are presented. (Author)

AD-468 333 Field 21B, 21I, 19A
CFSTI Prices: HC$2.60 MF$0.50
Picatinny Arsenal, Dover, N. J.
A STUDY OF COMBUSTION CATALYSIS AND PROPELLANT DECOMPOSITION BY MASS SPECTROMETRY,
by R. P. Baumann, and J. P. Picard. Jul 65, 23p
TM-1685
Proj. DA-1C222901A211

Descriptors: (*Mass spectroscopy, Combustion), (*Combustion, Catalysis), (*Propellants, Decomposition), (*Nitrocellulose, Combustion), Fuel additives, Propellant grains, Chemical reactions, Spectrum analyzers, Free radicals, Pyrolysis, Lead, Oxidation-reduction reactions.

A research project designed to gain an understanding of the mechanism of action of ballistic modifiers in nitrocellulose based propellants was carried out. A study was undertaken to investigate the feasibility of using mass spectrometry to follow the reactions occuring on the decomposing surface of solid propellant grains. A special low pressure arc-image strand burner was designed and fabricated for monitoring on the New York University Mass Spectrometer. The spectrometer is a 60 degree sector fast scan machine allowing 1000 sweeps/second with an accuracy on simple mixtures with interfering peaks between 0.05 and 1.0%. The equipment worked extremely well and can be considered applicable to studying a wide range of solid propellants. A number of unstable species and free radicals were found: particularly NO3, CH3CO (.), and CHO (.). These species were not only detected during and after 'burning' but also were detected prior to any visual indication of decomposition. Preliminary data indicates that lead catalysts increase the rate of oxidation-reduction reaction between, probably, CH3CO (.) and NO3. (Author)

AD-469 052 Field 21B, 20D, 21H
CFSTI Prices: HC$5.60 MF$0.50
Virginia Univ., Charlottesville.
MIXING AND COMBUSTION OF A SUPERSONIC FUEL JET AND A SUBSONIC, COAXIAL GAS STREAM,
by John E. Scott Jr. Aug 65, 52p UVA-7-P
Contract Nonr-3623 (00)
Proj. NR-098-038
Report on Project Squid. Prepared for presentation at the AIAA Second Annual Meeting 26-29 Jul 65, San Francisco, Calif.

Descriptors: (*Jet mixing flow, Fuels), (*Combustion, Supersonic flow), (*Thrust augmentation, Supersonic flow), Subsonic flow, Burning rate, Ducts, Velocity, Turbulence, Chemical reactions, Monopropellants, Rocket motors.

Identifiers: Squid project.

An experimental investigation of mixing and burning is described in which the progress of mixing and burning is followed by observing the spatial variation of static pressure in the mixing duct. Experiments showed that the duct length required for mixing and for mixing with simultaneous chemical reaction of the gaseous fuel jet are identical and are independent of the amount to be mixed and burned. In order to aid in the interpretation of the experimental data, the flow field is assumed to be 'piecewise uniform' over the mixing duct cross section. The analytical variation of the static pressure in the mixing duct agrees in a semi-quantitative manner with the experimental data. The experimental and analytical results are combined to provide the spatial and temporal variation of the mixing parameter. It is found that the combustion process has the general effect of increasing the mean duct velocity which increases the turbulent exchange coefficient and, hence, increases the mixing rate. For the experimental geometry considered, the mixing and burning time is roughly half of the time required for mixing only and is independent of the energy released in the chemical reaction. (Author)

AD-462 506 See Field 21I

AD-472 135 See Field 21I

AD-634 136 See Field 21H

AD-634 276 See Field 21I

AD-634 277 See Field 21I

AD-634 278 See Field 21I

AD-634 296 See Field 21I

AD-634 307 See Field 19D

BNWL-206 See Field 18I

LA-3451 See Field 6R

21D. FUELS

AD-634 681 Field 21D
CFSTI Prices: HC$1.00 MF$0.50
Army Tank-Automotive Center, Warren, Mich.
THE THEORY OF OPERATION OF AN AMMONIA BURNING INTERNAL COMBUSTION ENGINE,
by Charles G. Garabedian, and John H. Johnson. Jun 66, 9p
Presented at the Army Science Conference (1966), U. S. Military Academy, West Point, N. Y., 14-17 June 1966. Complete proceedings available in two unclassified volumes as AD-634 615 and AD-634 616 and one classified volume available to qualified DDC users.

Descriptors: (*Ammonia, *Fuels), (*Internal combustion engines, Fuels), Army equipment, Vehicles, Propulsion, Combustion.

Two basic approaches are presented for achieving combustion of ammonia in internal combustion engines. The first approach is one of integrating the ammonia combustion capability into the research and development of engines for the 1975-80 time frame. This approach would have the objective of building and a multi-fuel engine which could use MED or commercially produced ammonia. The second approach is one of converting existing engines by the use of modification kits. This approach could be applied to engines in the 1965-70 time frame, and would appear to require the use of ammonia produced commercially since the MED concept has application in the 1980 time frame. (Author)

PB-169 988 Field 21D, 21E
CFSTI Price: HC$13.60
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
RAMJET TECHNOLOGY. AIR-FUEL MIXTURE PREPARATION,
by Malcolm A. Weiss. 1961, 135p TG-370-7
Contract NOrd-7386
AD-254 758
Prepared in cooperation with Esso Research and Engineering Co., Linden, N. J.

Descriptors: (*Ramjet engines, Mixtures), (*Fuels, Ramjet engines), Atomization, Fuel injection, Combustion, Evaporation.

Contents: Atomization; Mechanisms of atomization, Experimental method for measuring drop size distribution, Drop size distribution equations and average drop sizes, Results of experimental measurements of drop size, Mixing; Diffusion equations, Experimental diffusion data, Application to ramjet combustors, Evaporation; Equilibrium vaporization, Single drops, stationary atmospheres, Single drops, air streams, and Sprays. (Author)

21E. JET AND GAS TURBINE ENGINES

UCRL-14660 Field 21E, 13I
CFSTI Prices: HC$3.00 MF$0.75
California Univ., Livermore. Lawrence Radiation Lab.
HIGH TEMPERATURE TESTING OF GRAPHITE HELICAL-SCREW EXPANDERS AND COMPRESSORS.
by W. M. Wells, D. W. Hanner, J. L. McElroy, and E. Robinson. 21 Jan 66, 65p
Contract W-7405-eng-48

Descriptors: (*Graphite, Compressor parts), (*Compressors, High-temperature research).

For abstract, see T 66 15.

AD-634 387 See Field 20D

AD-634 396 See Field 20D

AD-634 404 See Field 20D

AD-634 503 See Field 1C

AD-634 671 See Field 20D

PB-169 988 See Field 21D

21F. NUCLEAR PROPULSION

SC-CR-66-2017 Field 21F, 22B, 18L
CFSTI Prices: HC$1.00 MF$0.50
New Mexico Univ., Albuquerque.
ROVER DESTRUCT TEST THREE, ABERDEEN PROVING GROUND.
Final rept.,
by T. T. Castonguay, T. B. Anderson, and R. C. Bower. Dec 65, 15p
Contract AT (29-1)-789

Descriptors: (*Nuclear propulsion, Aerospace craft), (*Aerospace craft, Nuclear power plants).

For abstract, see N 20 12.

SC-RR-65-551 Field 21F
CFSTI Prices: HC$4.00 MF$1.00
Sandia Corp., Albuquerque, N. Mex.
ROVER POSTOPERATIONAL DESTRUCT INSTRUMENTATION DEVELOPMENT,
by R. E. Berry, and J. P. Martin. Dec 65, 119p
Contract AT (29-1)-789

Descriptors: (*Nuclear propulsion, Spacecraft debris), (*Radioactive fallout, Nuclear propulsion).

SC-RR-65-609 Field 21F, 21H
CFSTI Prices: HC$5.00 MF$1.00
Sandia Corp., Albuquerque, N. Mex.
POODLE THRUSTER AERODYNAMIC DROP TEST,
by W. D. Dalby. Apr 66, 152p
Contract AT (29-1)-789

Descriptors: (*Rocket motors, Drop testing), (*Space propulsion, Rocket motors).

Identifiers: Poodle thruster.

For abstract, see N 20 12.

UCRL-7644 See Field 9B

21G. RECIPROCATING ENGINES

AD-634 387 See Field 20D

AD-634 396 See Field 20D

AD-634 404 See Field 20D

21H. ROCKET MOTORS AND ENGINES

AD-462 137 Field 21H, 13H
CFSTI Price: HC$13.60
Thiokol Chemical Corp., Huntsville, Ala.
EVALUATION OF THREE ARDE-PORTLAND CRYOGENIC STRETCHED FORMED SUB-SCALE ROCKET MOTOR CASES,
by David L. Daigle. 23 Apr 65, 140p U-65-21A, Rept. no. 21-65
Contract DA-01-021-ORD-11919, Mod-33

Descriptors: (*Rocket cases, Stretch forming), (*Stretch forming, Cryogenics), Performance (Engineering), Tests, Stainless steel, Failure (Mechanics), Pressure.

The cases were made from AISI 301 stainless steel by a cryogenic stretch forming process. After dimensional and radiographic inspections, each case was subjected to a hydrostatic burst pressurization test at -65F. The performance of the cases under the low temperature pressurization tests was entirely satisfactory. Each case failed in a ductile manner at biaxial strength levels of 310,500 psi (Case No. 1), 300,100 psi (Case No. 2), and 342,800 psi (Case No. 5). The maximum recorded elongation in each case was approximately 2 percent. The performance of the three cases under pressurization at low temperature has demonstrated that the cryogenic stretch forming process is a potential fabrication technique for the manufacture of motor cases for future Army missile systems. Further work is necessary to demonstrate better dimensional control (conformance of case dimensions to inspection drawings was poor), and also to demonstrate that the process can be used to fabricate larger sized high strength cases. (Author)

AD-464 722 Field 21H
CFSTI Price: HC$13.60
Boeing Co., Seattle, Wash. Aero-Space Div.
LARGE MOTOR CASE TECHNOLOGY EVALUATION, VOLUME I.
Summary progress rept. no. 1, 11 Jun 64-11 Jun 65.
Jun 65, 133p
Contract AF 33 (615)-1623

Descriptors: (*Rocket motors (Solid propellant), Rocket cases), (*Rocket cases, Materials), Feasibility studies, Toughness, Steel, Maraging steels, Stresses, Welding, Welds, Failure (Mechanics), Panels (Structural), Non-destructive testing, Statistical analysis, Heat treatment, Porosity.

The results of base metal and weldment tests, and analyses of design deviations on materials and configurations of large solid motor cases of the 623A class are presented. A resultant end product of the above is the development of tables and curves depicting allowable initial flaw sizes in weldments of three large motor case designs. Such data considers the combined effect of material toughness, anticipated subcritical flaw growth, and total applied stresses which includes the effects of designed and manufactured discontinuities. A second phase of this program summarized in this volume is the data generated during a statistically designed experiment devoted to the development of welding processes on three promising new materials. The effects of welding process variables on weld quality and toughness (KIC) are shown. (Author)

AD-466 458 Field 21H, 7D, 11D
CFSTI Prices: HC$6.60 MF$0.75
Union Carbide Research Inst., Tarrytown, N. Y.
PRINCIPLES GOVERNING THE BEHAVIOR OF SOLID MATERIALS IN SEVERE HIGH TEMPERATURE ENVIRONMENTS.
Quarterly progress rept. for 8 Mar-30 Jun 65,
by S. R. Aspinall. 30 Jun 65, 65p
Contract DA-01-021-AMC-11926 (Z)

Descriptors: (*Rocket motor nozzles, Chemical reactions), (*Nozzle inserts, High-temperature research), (*Tungsten, Chemical reactions), (*Composite materials, Carbides), (*Carbides, Nozzle inserts), Solids, Materials, Water vapor, Carbon dioxide, Hydrogen compounds, Fluorides, Combusion products, Mass spectrum, Graphite, Tantalum compounds, Silver, Strength, Corrosion, Nickel, Bonding, Hafnium compounds, Zirconium compounds.

Identifiers: Hafnium carbides, Hydrogen fluoride, Tantalum carbide, Zirconium carbide.

The reaction between high-density tungsten and H2O vapor was studied from 1900 to 2800K in the induction-heated stagnation-flow reactor at H2O partial pressures from 25 to 155 torr. Rate data previously obtained for the W-CO2 reaction was analyzed in terms of a model including diffusion effects. Difficulties traceable to the slow reaction of W with HF were encountered in the study of the W-HF reaction. The relative rates of production of gaseous O, WO, and WO2 by the W-CO2 reactions were studied mass-spectrometrically. Two tungsten nozzle inserts and holders instrumented with thermocouples were completed. Transverse rupture strength (TRS) data confirm the desired behavior of the TaC-Ag skeletal composites. Vaporization of silver from and chemical corrosion of TaC-Ag composites and commercial W-Ag composites were studied in the arc-image reactor. Skeletal carbides using Ni as an infiltrant do not maintain their strength at temperatures approaching the melting point of nickel. Self-bonded 80 TaC/20 HfC and 80 TaC/20 ZrC alloys were prepared for composite fabrication and their transverse rupture strengths measured. (Author)

AD-634 136 Field 21H, 21B
CFSTI Prices: HC$2.00 MF$0.50
Army Materials Research Agency, Watertown, Mass. Materials Engineering Div.
MECHANISMS OF EROSION OF TITANIUM BORONITRIDE ROCKET NOZZLES.
Technical rept.,
by Anthony K. Wong, and James Brown. May 66, 33p
Proj. DA-1C022401A110
AMRA-TR-66-12

Descriptors: (*Rocket motor nozzles, *Erosion), Rocket motors (Solid Propellant), Refractory materials, Ceramic materials, Titanium compounds, Boron compounds, Nitrides, Solid rocket propellants, Aluminum, Captive tests.

Four rocket nozzles with throat diameters varying from 0.71 to 2.0 inches were fabricated from titanium boronitride compacts. This newly developed material was formed from titanium and boron nitride powders utilizing high compaction pressures and high reaction temperatures. Two compositions were investigated. Test firings of these nozzles were carried out in solid propellant static test rocket engines utilizing aluminized propellants with theoretical flame temperatures of 5500, 5600, and 6400 F. Post test analysis revealed the presence of cracks attributable to thermal shock and processing deficiencies. The erosion encountered varied from negligible to extremely severe. In the most severe case, the primary mechanism of erosion was established to be oxidation and conversion of the higher melting temperature constituents into a lower melting temperature oxide, followed by melting and removal from the nozzle contoured surface under the action of shearing stresses exerted by the hot flowing propellant exhaust gases. However, with the 5500 and 5600 F propellant, the mechanism of erosion was principally one of mechanical abrasion. Under limited conditions, a firmly supported titanium boronitride rocket nozzle may prove to be satisfactory. (Author)

N66-15295 Field 21H
CFSTI Prices: HC$3.00 MF$0.75
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
ROCKET MOTOR SPIN DATA,
by M. H. Lucy, G. B. Northam, and R. L. Swain. 1964, 67p NASA-TM-X-56052
Presented at the Naval Ordnance Sta. Symp. on Behavior of Propellants under Acceleration Fields, China Lake, Calif. Nov 18-19 1964.

Descriptors: *Flight test, *Rocket flight, *Environmental testing, *Solid propellant rocket engine.

For abstract, see T 66 15.

N66-16073 Field 21H
CFSTI Prices: HC$5.00 MF$1.00
Chrysler Corp., Huntsville, Ala. Space Div.
SATURN STAGE S-I-8 FINAL STATIC TEST REPORT,
by J. K. Crawford. 5 Aug 64, 151p
Contract NAS8-4016
NASA-CR-69702

Descriptors: *Saturn launch vehicle, *Static testing, *Flight simulation.

AD-469 052 See Field 21B

SC-RR-65-609 See Field 21F

UCRL-7644 See Field 9B

21I. ROCKET PROPELLANTS

AD-462 506 **Field 21I, 21B**
CFSTI Price: HC$2.60
Malaker Labs., Inc., High Bridge, N. J.
KINETIC STUDY OF ROCKET EXHAUST GASES.
Progress rept. no. 3, 1 Nov 60-Oct 61,
by C. J. Anderson, E. W. O'Hanlon, and R. A. Rossi.Oct 61, 27p CM-103-3
Contract DA-30-069-ORD-2918
Proj. DA-TB5-20
See also PB-153 966.

Descriptors: (*Exhaust gases, Rocket motors), (*Solid rocket propellants, Combustion), (*Fuel additives, Solid rocket propellants), Reaction kinetics, Burning, Analysis, Spectroscopy.

A study of the combustion of solid propellants was undertaken to develop a procedure to evaluate the degree of combustion when various additives are added to the fuel. Preliminary experiments showed that the test procedure did not yield reproducible results. The main obstacle was the short burning time of the usual six-inch propellant strands. A study was made of alternate burning devices in an effort to use longer strands and thus obtain longer burning times. Since no suitable apparatus is available, Malaker Laboratories developed the design principles and the preliminary design of such a unit. (Author)

AD-472 135 **Field 21I, 21B**
CFSTI Prices: HC$1.10 MF$0.50
New York Univ., N. Y. Dept. if Chemical Engineering.
MECHANISM OF CIALYTIC IGNITION AND COMBUSTION OF SOLID ROCKET PROPELLANTS.
Bimonthly rept. no. 2, 21 Jul-20 Sep 65,
by Y. A. Tajima. 20 Sep 65, 8p
Contract DA-28-017-AMC-2222 (A)

Descriptors: (*Solid rocket propellants, Catalysis), (*Bipropellants, Catalysis), (*Ignition, Solid rocket propellants), (*Combustion, Solid rocket propellants), Burning rate, Reaction kinetics, Time, Temperature, Degradation, Combustion products, Mass spectrum.

The objective is to investigate the mechanism of action of burning rate catalysts in the ignition and combustion of double-base propellants. Experimentally, the surface temperatures of burning propellant strands were measured and chemical-kinetic investigations of the products of degradation of the regressing surface are carried out. Heat is supplied by an arc image furnace for the ignition studies. Progress of work on ignition times and temperatures, and mass spectroscopy of flames is reported.

AD-476 515 **Field 21I, 20K**
CFSTI Prices: HC$10.60 MF$0.75
Rohm and Haas Co., Huntsville, Ala.
APPLICATION OF THE FINITE ELEMENT METHOD TO STRESS ANALYSIS OF SOLID PROPELLANT ROCKET GRAINS. VOLUME II, PART I,
by Eric B. Becker, and John J. Brisbane. 21 Jan 66, 101p S-76-Vol-2-Pt-1
Contracts DA-01-021-AMC-11536 (Z), DA-01-021-ORD-12341 (Z)
See also AD-474 031.

Descriptors: (*Solid rocket propellants, Stresses), (*Rocket propellant grains, Stresses), Numerical analysis, Programming (Computers), Loading (Mechanics).

Identifiers: Finite element analysis, Stress analysis.

A series of computer programs based on finite element methods was developed for the stress analysis of solid propellant rocket grains and similar geometric configurations. These programs have the capability of analyzing (1) a linear elastic, isotropic, axisymmetrically loaded, axisymmetric propellant grain with (or without) an orthotropic elastic motor case, (2) a linear elastic, isotropic, plane section with (or without) an orthotropic case, or (3) an axisymmetric, orthotropic shell. Loadings of arbitrarily varying pressure, body force, and thermal gradients are allowable. Extensive data generation and data output features are included in the programs to reduce both errors and effort involved in data preparation and data reduction. (Author)

AD-476 735 **Field 21I, 20K**
CFSTI Prices: HC$10.60 MF$0.75
Rohm and Haas Co., Huntsville, Ala.
APPLICATION OF THE FINITE ELEMENT METHOD TO STRESS ANALYSIS OF SOLID PROPELLANT ROCKET GRAINS. VOLUME II, PART I,
by Eric B. Becker, and John J. Brisbane. 21 Jan 66, 106p S-76-Vol-2-Pt-2
Contract DA-01-021-ORD-12341 (Z), DA-01-021-AMC-11536 (Z)

Descriptors: (*Solid rocket propellants, Stresses), (*Rocket propellant grains, Stresses), Numerical analysis, Programming (Computers), Loading (Mechanics).

Identifiers: Finite element analysis, Stress analysis.

The document is a direct continuation of Volume II, Part I (AD-476 515), Q. V.

AD-634 276 **Field 21I, 21B**
CFSTI Prices: HC$3.00 MF$0.75
Princeton Univ., N. J. Dept. of Aerospace and Mechanical Sciences.
RESEARCH ON SOLID PROPELLANT IGNITION. PART I. THEORETICAL SEARCH FOR ANALYTICAL SOLUTIONS TO THE GAS PHASE IGNITION PROBLEM. PART II. EFFECTS OF FUEL VOLATILITY AND OTHER PHYSICAL AND CHEMICAL FACTORS ON IGNITABILITY.
Annual technical rept., 1 Oct 64-30 Sep 65,
by C. H. Waldman, and Lubomyr Kurylko. Mar 66, 77p Aerospace/Mechanical Sci-770
Contract AF 49 (638)-1267
Proj. AF-9711
Task 971101
AFOSR-66-0939

Descriptors: (*Solid rocket propellants, *Ignition), Gases, Theory, Vaporization, Boundary layer, Chemical reactions, Diffusion, Differental equations, Vapors, Ignition lag, Hydrocarbons, Shock tubes, Molecular structure.

The mechanism of ignition being analyzed is based on the hypothesis that the runaway reaction occurs in the gas phase, in a thin boundary layer adjacent to the solid propellant surface being heated, between the reactive fuel and oxident vapors liberated from the surface. Differential equations can be written for the diffusion of vapors from the surface, reaction in the gas phase, heat feedback to the surface, and heating up of the surface. As a first treatment the propellant is taken as a simple fuel and the oxidant is available only in the gas phase. An experimental study was conducted to determine the ignition delay time for various hydrocarbons and for solid propellants when exposed suddenly to a hot, high pressure oxidizing atmosphere. The main purpose was to measure effects that would help in a diagnostic way to decide whether the gas phase theory of ignition is based on the correct physical model. Attempts were made to relate the ignition delay to physical and chemical properties of the fuel to test the hypothesis that the ignition reaction of these compounds starts in the gas phase. A 19 foot long, 1.6 inch I.D. shock tube was used as an investigating tool. The test gas was heated to 1400K behind the reflected shock wave at the end wall of the shock tube. (Author)

AD-634 277 **Field 21I, 7D, 21B**
CFSTI Prices: HC$7.00 MF$1.25
Princeton Univ., N. J. Dept. of Aerospace and Mechanical Sciences.
THE HOMOGENEOUS GAS PHASE KINETICS OF REACTIONS IN THE HYDRAZINE-NITROGEN TETROXIDE PROPELLANT SYSTEM.
Technical rept.,
by Robert F. Sawyer. 1965, 339p TR-761
Contract AF 49 (638)-1268
AFOSR-66-0855

Descriptors: (*Liquid rocket propellants, Reaction kinetics), (*Hydrazine, Reaction kinetics), (*Liquid rocket oxidizers, Reaction kinetics), (*Nitrogen compounds, Reaction kinetics), Oxides, Gases, Oxidation, Pyrolysis, Ammonia, Hydrogen, Dioxides, Heat of reaction, Heat of activation, Oxygen, Chemical equilibrium, Enthalpy.

A number of different homgeneous gas phase reactions arising from the possible combinations of the fuels: hydrazine, ammonia, hydrogen, and decomposed hydrazine with the oxidizers: nitrogen dioxide, oxygen, nitric oxide, and decomposed nitrogen dioxide were investigated in the same adiabatic flow reactor at temperatures falling between 800K and 1300K. Heats of reaction, reaction orders, and reaction rates were determined. From the measured reaction rates, Arrhenius rate constants were calculated and overall activation energies determined. Based on the experimental observations and the work of other investigators on related reactions, reaction mechanisms were postulated.

AD-634 278 **Field 21I, 21B, 20A**
CFSTI Prices: HC$7.00 MF$1.50
Princeton Univ., N. J. Dept. of Aerospace and Mechanical Sciences.
SOLID PROPELLANT COMBUSTION INSTABILITY; OSCILLATORY BURNING OF SOLID ROCKET PROPELLANTS.
Scientific rept., 1 Jun 63-30 Sep 64,
by R. H. Woodward Waesche, and Martin Summerfield. Aug 65, 310p Aerospace/Mechanical Sci-751
Grant AF-AFOSR-448-63, ARPA Order-317-62-Amend-9,
Proj. AF-920F-3814
AFOSR-66-0937

Descriptors: (*Solid rocket propellants, Combustion), (*Combustion, Acoustic properties), Stability, Rocket motors (Solid propellant), Oscillation, Theory, Reviews, Flames, Pressure, Entropy, Damping.

Contents: The occurrence of combustion instability in solid propellant rocket motors; The morphology of combustion oscillations; Theories of elemental processes in combustion instability - a literature survey; A detailed discussion of pressure coupling with the surface flame zone; Experimental studies on the nature of the pressure - surface flame coupling; Consideration of possible experiments to measure acoustic admittance; Acoustic admittance and entropy waves; Experimental apparatus; Experimental results; Damping mechanism studies; Conclusions and future experiments.

AD-634 296 **Field 21I, 21B, 20A**
CFSTI Prices: HC$1.00 MF$0.50
Stanford Research Inst., Menlo Park, Calif.
RESPONSE OF A BURNING PROPELLANT SURFACE TO EROSIVE TRANSIENTS.
Quarterly rept. no. 1, 1 Jan-31 Mar 66,
by E. L. Capener, L. A. Dickinson, and G. A.

Marxman.22 Apr 66. 24p
Contract AF 49 (638)-1665
Proj. SRI-FRU-5818
AFOSR-66-0938

Descriptors: (*Solid rocket propellants, *Erosive burning), Combustion, Surfaces, Transients, Ammonium compounds, Perchlorates, Acoustic properties, Sound, Attennation, Stability, Heat transfer, Gas flow, Theory, Aluminum.

Identifiers: Ammonium perchlorate, Aluminized propellants.

It was previously found that the heat release in the solid phase was associated with the driving process of unstable combustion. Since most of the propellants of interest are based on ammonium perchlorate (which has been shown to endow propellants with instability), it was considered necessary to identify the processes which could attenuate acoustic waves. A study of loss mechanism demonstrated that end losses are significant and enhance both axial and transverse stability. In the case of axial instability the enhanced heat transfer to the end closure was examined using heat transfer gages. Theoretical studies are continuing in an attempt to integrate combustion response to the gas dynamics of the cavity. (Author)

AD-432 061 **See Field 7B**

AD-468 333 **See Field 21B**

AD-634 219 **See Field 7D**

AD-634 440 **See Field 7B**

PB-169 580 **See Field 11J**

22A. ASTRONAUTICS

N66-14327 **Field 22A**
CFSTI Prices: HC$4.00 MF$0.75
National Academy of Sciences-National Research Council, Washington, D. C. Space Science Board.
SPACE RESEARCH. DIRECTIONS FOR THE FUTURE. PART ONE. PLANETARY AND LUNAR EXPLORATION.
Dec 65, 144p
Contract NSR-09-012-903
NASA-CR-69-76

Descriptors: Atmosphere, Exploration, Interplanetary, Lunar, Magnetic, Planetary, Solar, *Upper atmosphere, Dust, Field, Interplanetary dust, Lunar Exploration, *Magnetic field, *Planetary exploration, *Solar atmosphere, Wind.

For abstract, see T 66 15.

N66-14418 **Field 22A**
CFSTI Prices: HC$3.00 MF$0.75
Texas Aand M Research Foundation, College Station.
THE DETERMINATION OF EMPIRICAL AND ANALYTICAL SPACECRAFT PARAMETRIC CURVES - THEORY AND METHODS.
Progress rept. no 1.
1 Dec 65, 71p
Contract NGR-44-001-027
NASA-CR-68967

Descriptors: *Mathematics (Gen), *Spacecraft.

AD-634 353 **See Field 5C**

AD-634 608 **See Field 6R**

PB-169 408 **See Field 6C**

22B. SPACECRAFT

AD-476 286 **Field 22B**
CFSTI Prices: HC$5.00 MF$1.00
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
STRUCTURAL DESIGN ANALYSIS AND TESTING OF THE GEOS SATELLITE.
Technical memo.,
by James E. Phenix. Sep 65, 154p TG-730
Contract NOw-62-0604-c

Descriptors: (*Scientific satellites, Design), Tests, Light pulses, Solar cells, Lasers, Reflectors, Performance (Engineering), Loading (Mechanics), Stresses, Acceptability, Vibration, Structural shells, Geodesics.

Identifiers: GEOS satellite.

Design analysis and static and dynamic testing of the GEOS structure were completed. Successful prototype static load and vibration design qualification testing, in addition to comprehensive load and stress analyses, demonstrated the structural adequacy of the GEOS A spacecraft. This report documents all significant analyses and tests with the exception of the prototype vibration test. The latter is presented in 'Vibration Testing of the GEOS A Prototype', APL/JHU Internal Memo S4M-2-28, to be published. (Author)

AD-479 217 **Field 22B, 1D**
CFSTI Prices: HC$2.00 MF$0.50
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
ON THE DYNAMICS OF A SATELLITE STABILIZED BY WIRES.
Technical memo.,
by Robert R. Newton. Feb 66, 35p TG-811
Contract NOw-62-0604-c

Descriptors: (*Satellites (Artificial), Stabilization systems), (*Attitude control systems, Satellites (Artificial)), Wire, Aerodynamic control surfaces, Aerodynamics, Astronautics, Dynamics.

The attitude of a satellite can be made stable in all three libration angles by a suitable arrangement of wires rather than rigid members to give the necessary vertical extent. In one stabilization method, four wires are connected to the main satellite body at points as far apart as possible. The other ends of the wires are connected to a small mass, yielding a pyramidal configuration. This paper analyzes the normal modes of libration and the response to perturbing torques of such a satellite. It is shown that the long axis of the main body should point in the direction of motion. That is, the main body should be held in a position of unstable equilibrium. It is also shown that the effects of radiation pressure and thermal distortion are an order of magnitude smaller than for equivalent satellites using rigid structures. (Author)

N66-15238 **Field 22B**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
APPLICATION OF DIGITAL COMPUTER TECHNIQUES TO THE STUDY OF THE IMPACT DYNAMICS OF LUNAR-LANDING VEHICLES,
by B. J. Durling, H. W. Leonard, and W. C. Walton.1964, 16p NASA-TM-X-54961
Presented at the Meeting of the Acoust. Soc. of Am. (68th), Austin, Tex., Oct 21, 1964.

Descriptors: *Lunar landing module, *Digital technique, *Impact.

AD-413 944 **See Field 4B**

AD-433 559 **See Field 13H**

AD-634 292 **See Field 18H**

AD-634 359 **See Field 4A**

AD-634 377 **See Field 15C**

AD-634 381 **See Field 4B**

AD-634 570 **See Field 22D**

AD-634 672 **See Field 4B**

SAN-575-12 **See Field 6K**

SC-CR-66-2017 **See Field 21F**

TID-22350 **See Field 10A**

22C. SPACECRAFT TRAJECTORIES AND REENTRY

AD-424 483 **Field 22C, 14B**
CFSTI Price: HC$7.60
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
USE OF OPTICALLY PUMPED RUBIDIUM VAPOR FREQUENCY STANDARD AS MASTER OSCILLATOR IN SATELLITE TRACKING STATIONS,
by R. F. Gavin. Oct 63, 71p TG-505-Rev

Descriptors: (*Atomic clocks, Satellite tracking systems), (*Satellite tracking systems, Atomic clocks), (*Time signals, Satellite tracking systems), (*Frequency, Standards), Oscillators, Rubidium, Vapors, Pumping (Optical).

By means of clock time transfer, the precise location of a tracking station can be established through the computation of orbits relative to other known locations. Once the tracking site has been established in earth-coordinates, time can be precisely recovered at the station via the satellite link independent of all other time and frequency standard transmissions. Current practice in the tracking network is to set station time by monitoring high frequency transmissions (WWV, WWVH, etc) and to determine working oscillator drift characteristics by monitoring standard VLF transmissions (WWVL, GBR, NBA, etc). Empolyment of commercially available ultra stable standards as master oscillators in ground stations of a tracking network will eliminate dependence on standard broadcast transmissions. Presented in this report is a method of instrumentation with procedures for holding station time error to within plus or minus 100 microseconds relative to UT-2 (over a period of approximately 100 days) and frequency to within a few parts in 10 to the 11th power per month; apoch will be determined according to observations of the U. S. Naval Observatory. (Author)

AD-447 904 **Field 22C**
CFSTI Price: HC$5.60
Frank J. Seiler Research Lab., Air Force Academy, Colo.
MINIMUM FUEL TRAJECTORIES WITH SOFT LANDINGS,
by Orlando J. Melci Jr. 30 May 64, 52p SRL-64-2
Proj. AF-7904
Task 790401
Prepared for presentation at Science and Engineering Symposium, 1964.

Descriptors: (*Lunar trajectories, Mathematical analysis), (*Energy management, Lunar trajectories), (*Lunar craft, Landings), Moon, Gravity, Rocket propellants, Fuel consumption, Combustion, Velocity, Boundary value problems, Equations, Motion, Algebraic topology, Differential equations, Tables.

Minimum fuel trajectories for rocket flights with soft landings in a uniform gravitational field are presented as functions of two parameters. The solutions are valid for any uniform gravitational field, rocket fuel, and burning rate. The problem is formulated as a flight over a flat moon without atmosphere. The solution is subject to the differen-

tial constraints of the equations of motion and the end point conditions which require zero velocity at take-off and landing. (Author)

AD-634 206 **Field 22C**
CFSTI Prices: HC$1.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
SINGLE-STATION COVERAGE FOR EARTH-SATELLITE ORBITS.
Technical rept.,
by R. H. Merson. Jan 66, 20p TR-66029

Descriptors: (*Satellite tracking systems, Effectiveness), (*Circular orbit trajectories, Satellites (Artificial)), Abundance, Great Britain.

In co-ordinated studies of station siting and satellite orbit specification, an important factor is the frequency of occurrence of satellite passes over the station. This factor has a bearing for example, on the accuracy with which the orbit can be determined, particularly in the case of a minimal tracking network. In this paper an algorithm is derived for determining the average number of passes per day of a satellite in a circular orbit of given height and inclination over a ground station having given latitude and acquisition angle. An approximate procedure for treating eccentric orbits is also given. This paper was originally presented at a meeting of COSPAR Working Group 1, Florence, May 1964. (Author)

AD-634 273 **Field 22C, 20D**
CFSTI Prices: HC$3.00 MF$0.75
Illinois Univ., Urbana. Coordinated Science Lab.
AERODYNAMIC TORQUE ON A SPINNING SPHERICAL SATELLITE WITH APPLICATION TO MEASUREMENT OF ACCOMMODATION COEFFICIENTS,
by Gerald R. Karr, May 66, 57p R-295
Contract DA-28-043-AMC-00073 (E), Grant NsG-443

Descriptors: (*Aerodynamics, *Satellites (Artificial)), Torque, Spin, Surface properties.

A spinning spherical satellite has been proposed by the Coordinated Science Laboratory to measure a general relativity effect which is predicted to cause the spin axis of the satellite to precess 5 to 7 sec of arc per year. Measurement of the precession is realized by a unique method or read-out which utilizes terrestrial sightings of sunlight reflected from mirrors on the satellite's surface. The measurement of such a small precession rate required an investigation of other torques producing effects which could possibly prevent the isolation of the relativity effect. In this respect, the analysis to determine the aerodynamic torque was initiated. The study consists of first obtaining the general analytical experession for aerodynamic torque which is found to depend upon the orientation of the satellite and the accommodation coefficient of the surface. Consideration is given to the effect of nonuniform distribution of accommodation coefficient and orbital regression effects which cause a change in satellite orientation with time. When these results are applied to the CSL satellite two conclusions are evident. These conclusions are discussed in the report and the feasibility of performing a satellite experiment to measure the accommodation coefficient by the technique proposed by the Coordinated Science Laboratory is investigated. (Author)

AD-634 291 **Field 22C, 3C**
CFSTI Prices: HC$4.00 MF$0.75
Royal Aircraft Establishment, Farnborough (England).
SATELLITE MOTION IN AN AXI-SYMMETRIC FIELD, WITH AN APPLICATION TO LUNI-SOLAR PERTURBATIONS.
Technical rept.,
by R. H. Gooding. Jan 66, 122p TR-66018

Descriptors: (*Satellites (Artificial), Motion), (*Celestial mechanics, Satellites (Artificial)), Perturbation theory, Potential theory, Great Britain.

The disturbing function for an axi-symmetric potential field is expanded into a doubly infinite Legendre harmonic series. The effect of the general harmonic term on the motion of a satellite in the field is developed by averaging with respect to the mean anomaly of the satellite and applying Lagrange's planetary equations. Expressions for the variation of orbital elements due to the main harmonics are listed, the results being applicable to the perturbations of an earth satellite due to asphericity of the earth and luni-solar influence. General expressions for secular and long-period perturbations are obtained. (Author)

AD-634 390 **Field 22C**
CFSTI Prices: HC$1.00 MF$0.50
Mitre Corp., Bedford, Mass.
HIGH-ALTITUDE REENTRY DRAG EFFECTS,
by S. Sharenson. Jun 66, 20p MTR-160
Contract AF 19 (629)-5165
Proj. AF-8090
ESD-TR-66-95

Descriptors: (*Reentry vehicles, *Drag), (*Atmosphere entry, Drag), Trajectories, High altitude, Mathematical analysis.

The effect of atmospheric drag on the trajectory of a reentry body is considered. The analysis is valid in the high altitude regime. Results are presented as the differential displacement and velocity from the vacuum trajectory for various values of ballistic coefficient. (Author)

AD-634 600 **Field 22C, 20D**
CFSTI Prices: HC$3.00 MF$0.75
Aeronutronic Div., Philco Corp., Newport Beach, Calif.
SHOCK-SHOCK INTERACTION THEORY INCLUDING REAL GAS AND THREE DIMENSIONAL EFFECTS.
Final rept.,
by Thomas D. Taylor. Apr 66, 75p AMC-66-3
Contract DA-28-017-AMC-1989 (A)
Task NWER-01.024
PA-TR-3319

Descriptors: (*Shock waves, Blast), (*Atmosphere entry, Shock waves), (*Reentry vehicles, Atmosphere entry), Numerical analysis, Programming (Computers).

The report presents a numerical technique which can be employed to study the interaction of two nearly planar shock waves. The technique is applied to the head-on interaction of a blast wave and a bow shock of a re-entry vehicle. The application is limited to the axis of symmetry of the flow field. Real gas effects are included by allowing gamma (the adiabatic gas constant) to vary across flow discontinuities. The values of gamma are determined from curve fits to Gilmore's Tables. Three dimensional effects are incorporated in the study by using re-entry flow field calculations to obtain velocity gradients and flow conditions behind the re-entry bow shock. A computer program for the IBM 7090-94 which was developed to perform the shock-shock interaction study is given. (Author)

NAA-SR-11502 **Field 22C, 18J, 18N**
CFSTI Prices: HC$4.00 MF$1.00
Atomics International, Canoga Park, Calif.
THERMAL BEHAVIOR OF SNAP REACTOR FUEL ELEMENTS DURING ATMOSPHERIC REENTRY,
by A. W. Barsell, L. D. Montgomery, and J. E. Arnold. 25 Mar 66, 122p
Contract AT (11-1)-GEN-8

Descriptors: (*Reactor operation, Atmosphere entry), (*Atmosphere entry, Reactor operation).

For abstract, see N 20 13.

N66-14527 **Field 22C**
CFSTI Prices: HC$5.00 MF$1.00
Western Development Labs., Philco Corp., Palo Alto, Calif.
INTERPLANETARY NAVIGATION AND GUIDANCE STUDY. VOLUME II. TECHNICAL STUDY.
30 Oct 65, 176p WDL-TR-2629 Vol. II
Contract NAS8-11198
NASA-CR-69103

Descriptors: *Midcourse guidance, *Navigation + guidance, *Systems analysis, *Interplanetary flight, *Round-trip trajectory.

N66-15732 **Field 22C**
CFSTI Prices: HC$7.21 MF$2.25
Western Development Labs., Philco, Palo Alto, Calif.
PROGRAMMERS MANUAL FOR INTERPLANETARY ERROR PROPAGATION PROGRAM,
15 Nov 63, 421p WDL-TR-2184
Contract NAS5-3342
NASA-CR-69535

Descriptors: *Error, *Manual, *Programmer, *Interplanetary trajectory, *Lunar trajectory, *Tracking system.

PB169 455 **Field 22C, 3C**
CFSTI Prices: HC$2.60 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
RESONANCE EFFECTS FOR SATELLITES WITH NOMINALLY CONSTANT GROUND TRACK,
by R. R. Allan. Aug 65, 24p Technical rept. no. TR-65232

Descriptors: (*Satellites (Artificial), Orbital trajectories), (*Orbital trajectories, Resonance), Oscillation, Gravity, Communication satellites (Active), Kwematics, Synchronous satellites, Celestial mechanics, Tracking, Harmonic analysis, Great Britain.

Identifiers: Constant-ground-track satellites.

Since a 'constant-ground-track' satellite would continually pass over the same regions of the Earth, such orbits are in resonance with the longitude dependent part of the Earth's gravitational field. The situation is similar, but not completely analogous, to the case of synchronous satellites. For Beta-revolutions per day, the ground track will oscillate in longitude with a maximum amplitude of plus or minus 180/Beta degrees, the periods of oscillation being usually of the order of a few years for beta = 2.3 and 4. These effects depend strongly on the inclination of the orbit. (Author)

SC-RR-65-472 **Field 22C, 18N**
CFSTI Prices: HC$3.00 MF$0.50
Sandia Corp., Albuquerque, N. Mex.
CONTROLLED DEORBIT,
by J. A. Leonard, and W. W. Joseph. Mar 66, 47p
Contract AT (29-1)-789

Descriptors: (*Spacecraft debris, Disposal), (*Radiation hazards, Atmosphere entry).

SC-RR-65-615 **Field 22C, 14B**
CFSTI Prices: HC$3.00 MF$0.50
Sandia Corp., Albuquerque, N. Mex.
AN EXPERIMENTAL STUDY OF THE EFFECT OF OXYGEN ON TANTALUM ABLATION IN A HYPERTHERMAL PLASMA TUNNEL,
by B. W. Marshall. Apr 66, 56p
Contract AT (29-1)-789

Descriptors: (*Ablation, Tantalum), (*Atmosphere entry, Models (Simulations)).

For abstract, see N 20 13.

SC-RR-66-22 **Field 22C**
CFSTI Prices: HC$3.00 MF$0.75
Sandia Corp., Albuquerque, N. Mex.
A COMPARISON OF THE RESULTS OF THE SANDIA CORPORATION TTA TRAJECTORY PROGRAM AND THE ATOMICS INTERNATIONAL RESTORE TRAJECTORY PROGRAM,
by H. R. Spahr. Feb 66. 60p
Contract AT (29-1)-789

Descriptors: (*Atmosphere entry, Flight simulators), (*Flight simulators, Orbital trajectories).

SC-RR-66-41 **Field 22C**
CFSTI Prices: HC$2.00 MF$0.50
Sandia Corp., Albuquerque, N. Mex.
PROBABILITY DISTRIBUTIONS OF LATTICES OF REENTRY AND IMPACT FOLLOWING DECAY OF POLAR ORBITS,
by T. S. Edrington. Mar 66. 31p
Contract AT (26-1)-789

Descriptors: (*Polar orbit trajectories, Atmosphere entry), (*Atmosphere entry, Impact prediction).

AD-453 195 **See Field 9E**

AD-453 196 **See Field 9E**

AD-453 197 **See Field 9E**

AD-634 500 **See Field 20I**

22D. SPACECRAFT LAUNCH VEHICLES AND GROUND SUPPORT

AD-634 207 **Field 22D**
CFSTI Prices: HC$3.00 MF$0.75
Royal Aircraft Establishment, Farnborough (England).
A STUDY OF AN ATTITUDE CONTROL SYSTEM FOR THE BLACK ARROW LAUNCHING VEHICLE.
Technical rept.,
by C. H. Garnett, and R. G. Langton. Dec 65. 86p
TR-65270

Descriptors: (*Launch vehicles (Aerospace), *Attitude control systems), Great Britain, Performance (Engineering), Jets, Propellents, Stabilization systems, Satellites (Artificial).

Identifiers: Black arrow (Booster).

A specification for the Black Arrow attitude control system during the coasting phase is outlined. Consideration is given to the choice of system and the total impulse required, and it is concluded that reaction jets should be used with stored gaseous nitrogen or air as propellent. The performance of such a system during acquisition and limit cycle motion is analysed using phase-plane techniques with emphasis on the effects of valve delays, and the results of an analogue simulator study are recorded. Various methods of generating a signal proportional to angular rate are considered and the use of a rate gyro is tentatively recommended. Some engineering aspects of the design are examined including the choice of the control valve. Recommendations are made concerning testing philosophy and the development programme. (Author)

AD-634 570 **Field 22D, 22B, 16D**
CFSTI Prices: HC$2.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
SPACE PROJECTS IN THE UNITED KINGDOM.
Technical rept.
Feb 66. 42p TR-66058
This paper was read at the International Symposium on Space Technology and Science (6th), Tokyo, Nov-Dec 1965.

Descriptors: (*Launch vehicles (Aerospace), Great Britain), (*Satellites (Artificial), Great Britain), Space flight, Rockets, Guided missiles.

Throughout the last decade the United Kingdom has maintained an active programme of sounding rocket and ballistic missile development, from which the current space activities have emerged; the former weapon Blue Streak has become the first stage of the ELDO satellite launcher, Black Knight is being considered as the basis for a national launcher (Black Arrow), and Skylark is now used exclusively for space research. The paper describes these projects, as well as the U.K.3 and Black Arrow satellites, and concludes with a brief mention of related ground facilities. (Author)

N66-14553 **Field 22D**
CFSTI Prices: HC$7.93 MF$2.50
Bendix Systems Div., Bendix Corp., Ann Arbor, Mich.
SURVEYOR LUNAR ROVING VEHICLE, PHASE I. VOLUME III - PRELIMINARY DESIGN AND SYSTEM DESCRIPTION. BOOK 2 - VALIDATION OF PRELIMINARY DESIGN, SECTIONS 7-13.
Final technical rept.,
Apr 64. 493p BSR-903, Vol. III, BK.2, Sec. 7-13
Contract NAS7-100
NASA-CR-69102
Prepared in cooperation with Jet Propulsion Lab., Rept. no. JPL-950656.

Descriptors: *Lunar roving vehicle (LRV), *Surveyor project, *Systems design.

For abstract, see T 66 15.

N66-16080 **Field 22D**
CFSTI Prices: HC$5.00 MF$1.00
Chrysler Corp., Hunstville, Ala. Space Div.
SATURN S-IB STAGE. FINAL STATIC TEST REPORT. STAGE S-IB-1,
by R. D. Cox, and J. V. Wible. 4 Jun 65. 161p
Contract NAS8-4016
NASA-CR-69716

Descriptors: *Saturn S-IB stage, *Static testing, *Test firing.

SC-DC-65-1918 **Field 22D, 18E**
CFSTI Prices: HC$3.00 MF$0.75
TRW Systems, Redondo Beach, Calif.
STUDY OF THE CHEMICAL INTEGRITY OF RADIOISOTOPE CONTAINMENT MATERIALS IN LAUNCH ABORT ENVIRONMENTS.
Summary technical rept. (phase 1).
Dec 65. 68p
Contract AT (29-1)-789

Descriptors: (*Containment, Radioactive isotopes), (*Reactor safety systems, Launch vehicles (Aerospace)).

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MARYL

AERO
EQUIP

R. BR

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DOD-N

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STUDY

W. KO

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DOD-N

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CURRENT r & d PROJECTS

01 AERONAUTICS

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GSE 798 1 FIELD 20D

VA. INST. OF MARINE, ., VIRGINIA

AERODYNAMICS OF OSCILLATING AIRFOILS

C. D. CONE

NSF-GK-183
3/66- 3/67

NSF-ENGINEERING SCIENCES DIVISION

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ZQF 420557 FIELD 20D,20K

USAF, ARNOLD AFS, TENNESSEE

AERODYNAMIC PROBLEMS IN EXTREME LOW PRESSURE HIGH MACH FLIGHT REGIMES

J. L. POTTER

AF-40-600-01000
/65- /

DOD-AIR FORCE

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ZQN 530528 2 FIELD 1B,20D

USN, BUR SHIPS, CARDEROCK-D T MOD BAS, MARYLAND

AERODYNAMICS - WIND TUNNEL TESTS AND EQUIPMENT

R. BROBERG

/65- /

DOD-NAVY

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ZQN 530529 3 FIELD 1B

NAVAL AIR DEVELOPMENT, PENNSYLVANIA

AIRCRAFT FLIGHT STABILITY AND CONTROL STUDY

W. KOVEN

/65- /

DOD-NAVY

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ZQN 530566 FIELD 1C, 1B,20K,15G

USN, BUR SHIPS, CARDEROCK-D T MOD BAS, MARYLAND

AQM-37A TARGET/F-8 AIRPLANE LAUNCH/SEPARATION AND COMPATIBILITY PROGRAM

R. BROBERG

/65- /

DOD-NAVY

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ZQN 530567 FIELD 1B,20D,15C

USN, BUR SHIPS, CARDEROCK-D T MOD BAS, MARYLAND

FIREYE STORE DROP INVESTIGATION

R. BROBERG

/65- /

DOD-NAVY

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ZQN 530597 FIELD 20L,20K

NAVAL AIR DEVELOPMEN, PENNSYLVANIA

STRAIN AND FATIGUE STUDIES IN AIRCRAFT STRUCTURES

A. P. COWLES

/65- /

DOD-NAVY

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ZQN 530707 FIELD 1C, 1B,20D,20K

USN, BUR SHIPS, CARDEROCK-D T MOD BAS, MARYLAND

MODEL A-7A AIRPLANE SPIN MODEL CONSTRUCTION AND 0.05 SCALE HIGH SPEED MODEL MODIFICATION

R. BROBERG

/65- /

DOD-NAVY

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ZQN 530709 FIELD 1C, 1B,20D

USN, BUR SHIPS, CARDEROCK-D T MOD BAS, MARYLAND

AIRCRAFT/STORE CAPTIVE FLIGHT/LAUNCH AERODYNAMIC CHARACTERISTICS INVESTIGATION

R. BROBERG

/65- /

DOD-NAVY

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ZQN 530710 FIELD 1C, 1B,20D,20K

USN, BUR SHIPS, CARDEROCK-D T MOD BAS, MARYLAND

MODEL OV-10A AIRPLANE SPIN MODEL CONSTRUCTION

R. BROBERG

/65- /

DOD-NAVY

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ZQN 544080

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

PERMANENT AIR FACILITY FOR MCMURDO ANTARTICA

E. H. MOSER, R. A. PAIGE

/65- /

DOD-NAVY

03 ASTRONOMY AND ASTROPHYSICS

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GSP 1536 1 FIELD 3A, 3B, 4A, 9+

STANFORD UNIVERSITY, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, CALIFORNIA

IQSY RADAR STUDIES OF THE CISLUNAR GAS AND SOLAR CORONA

V. R. ESHLEMEN

NSF-GP-2711
4/65- 4/66

NSF-PHYSICAL SCIENCES DIVISION

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GSP 1658 1 FIELD 3A, 3B

UNIVERSITY OF MICHIGAN, GRADUATE SCHOOL, ASTRONOMY, MICHIGAN

METER WAVE SOLAR BURETE DURING THE IQSY

F. T. HADDOCK, J. M. MALVILLE

NSF-GP-2792
4/65- 4/66

NSF-PHYSICAL SCIENCES DIVISION

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GSP 1683 1 FIELD 3A, 3B, 4A

PENNSYLVANIA ST UNIV, SCHOOL OF ENGINEERING, AERONAUTICAL ENGIN, PENNSYLVANIA

SOLAR ACTIVITY DURING THE IQSY

J. P. HAGEN

NSF-GP-2986
3/65- 3/66

NSF-PHYSICAL SCIENCES DIVISION

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GSP 1934 2 FIELD 3A, 3B, 5A

UNIVERSITY OF OREGON, GRADUATE SCHOOL, ASTRONOMY, OREGON

ECLIPSING BINARIES

E. G. EBBIGHAUSEN, G. WENIGER

NSF-GP-4146
2/66- 2/67

NSF-PHYSICAL SCIENCES DIVISION

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GSP 2008 1 FIELD 3A, 4A, 4B, 5A

NEW YORK UNIVERSITY, GRADUATE SCHOOL, PHYSICS, NEW YORK

NEUTRON MONITOR OPERATION IN ALASKA

S. A. KORFF

NSF-GP-4211
3/66- 3/67

NSF-PHYSICAL SCIENCES DIVISION

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GSP 2036 1 FIELD 3A,12A

COLUMBIA UNIVERSITY, GRADUATE SCHOOL, ASTRONOMY, NEW YORK

DYNAMICS OF GALAXIES

K. H. PRENDERGAST, B. BARBANIS
E. R. TOMER, L. WOLTJER

NSF-GP-4194
3/66- 3/67

NSF-PHYSICAL SCIENCES DIVISION

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GSP 2037 1 FIELD 3A, 3C, 3B, 5A

RENSSELAER POLYTC INST, GRADUATE SCHOOL, PHYSICS, NEW YORK

SPECTROPHOTOMETRY OF EARLY-TYPE ECLIPSING BINARY SYSTEMS

A. S. MELTZER, E. C. OLSON

NSF-GP-4201
3/66- 3/67

NSF-PHYSICAL SCIENCES DIVISION

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GSP 2117 FIELD 3A, 3B, 7B

UNIVERSITY OF ILLINOIS, GRADUATE SCHOOL, ASTRONOMY, ILLINOIS

SPACE VELOCITIES OF LATE-TYPE STARS AS A FUNCTION OF CN ANOMALY

K. M. YOSS

NSF-GP-4232
3/65- 3/66

NSF-PHYSICAL SCIENCES DIVISION

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GSP 2118 FIELD 3A

UNIV OF PENNSYLVANIA, GRADUATE SCHOOL, ASTRONOMY, PENNSYLVANIA

M URSAE MAJORIS SYSTEMS

L. BINNENDIJK

NSF-GP-4393
7/65- 7/66

NSF-PHYSICAL SCIENCES DIVISION

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GSP 2219 FIELD 3A, 7B

HYDROGEN TO HELIUM RATIO IN THE SOLAR PHOTOSPHERE

C. A. ROUSE

NSF-GP-4764
7/65- 7/66

NSF-PHYSICAL SCIENCES DIVISION

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GSP 2491 FIELD 3A, 3B, 5A

UNIV OF CAL-BERKELEY, GRADUATE SCHOOL, CHEMISTRY, CALIFORNIA

ABUNDANCES IN PECULIAR A +B STARS

E. M. BURBIDGE, W. L. SARGENT

NSF-GP-4730
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

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GSP 2492 FIELD 3A, 3B, 5A, 7B

MONTANA STATE COLLEGE, GRADUATE SCHOOL, PHYSICS, MONTANA

FAST CN CYCLE IN STARS

G. R. CAUGHLAN

NSF-GP-4693
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

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ZQF 260062 FIELD 17G, 3A, 3B, 4A

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

SOLAR EUV INTENSITY MEASUREMENTS

L. A. HALL

/65- /

DOD-AIR FORCE

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ZQF 260093 FIELD 13B, 3A, 3B,14E

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

PLANETARY PHOTOGEOLOGY

J. F. CRONIN

/65- /

DOD-AIR FORCE

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ZQF 260125 FIELD 3A, 3B,20F

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

INFRARED CELESTIAL BACKGROUNDS

R. G. WALKER

/65- /

DOD-AIR FORCE

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ZQF 260133 FIELD 22A, 3A

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

LUNAR AND PLANETARY SURFACE MATERIALS UNDER SIMULATED ENVIRONMENT

J. W. SALISBURY

/65- /

DOD-AIR FORCE

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ZQF 260147 FIELD 8H,12A,20D

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

PLANETARY-SCALE CIRCULATIONS

L. BERKOFSKY

/65- /

DOD-AIR FORCE

04 ATMOSPHERIC SCIENCES

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77X 510 2 FIELD 13A,13B, 7D, 4B

USDHEW BSS ENGIN CTR, SANI ENG CTR,CINCINNAT, OHIO

DEVELOPMENT OF ANALYTICAL METHODS FOR METEOROLOGICAL TRACERS

A. ALTSHULLER

BSS-8-2-9
7/64- 6/65

PHS-BSS

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77X 510 3 FIELD 13A,13B, 7D, 4B

USDHEW BSS ENGIN CTR, SANI ENG CTR,CINCINNAT, OHIO

DEVELOPMENT OF ANALYTICAL METHODS FOR METEOROLOGICAL TRACERS

A. ALTSHULLER

BSS-8-2-9
7/65- 6/66

PHS-BSS

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GSP 279 4 FIELD 4B, 8C

UNIV OF CAL-LA JOLLA, GRADUATE SCHOOL, OCEANOGRAPHY, CALIFORNIA

CARBON DIOXIDE IN THE ATMOSPHERE AND ITS EXCHANGE WITH THE OCEANS

C. D. KEELING

NSF-GP-4193
3/66- 3/67

NSF-PHYSICAL SCIENCES DIVISION

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GSP 1212 2 FIELD 4A

STANFORD UNIVERSITY, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, CALIFORNIA

CONJUGATE VLF STUDIES AT GREAT WHALE RIVER

R. A. HELLIWELL

NSF-GP-1191
4/65-12/65

NSF-PHYSICAL SCIENCES DIVISION

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GSP 1294 2 FIELD 4A,18A

UNIVERSITY OF DENVER, GRADUATE SCHOOL, PHYSICS, COLORADO

TIME AND DIRECTIONAL VARIATIONS OF THE PENETRATING COSMIC RADIATION

R. L. CHASSON, M. IONA

NSF-GP-1930
7/65- 7/66

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GSP 1308 2 FIELD 4A, 9+

STANFORD UNIVERSITY, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, CALIFORNIA

VLF MEASUREMENTS AT FOUR STATIONS DURING IQSY

R. A. HELLIWELL

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7/65-12/65

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GSP 1481 1 FIELD 4A

UNIVERSITY NEW MEXICO, GRADUATE SCHOOL, PHYSICS, NEW MEXICO

ZODIACAL LIGHT DURING THE IQSY

V. H. REGENER

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4/65- 4/66

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GSP 1481 2 FIELD 4A

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ZODIACAL LIGHT DURING THE IQSY

V. H. REGENER

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GSP 1625 1 FIELD 3A, 4A, 5A,10A

WASHINGTON UNIVERSITY, GRADUATE SCHOOL, PHYSICS, MISSOURI

PRIMARY COSMIC RADIATION DURING IQSY

M. M. FRIEDLANDER, J. KLARMANN

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GSP 2122 FIELD 20D

UNIVERSITY OF CHICAGO, GRADUATE SCHOOL, GEOPHYSICAL SCIENCES, ILLINOIS

METEOROLOGICAL EXPERIMENTAL HYDRODYNAMICS

D. FULTZ

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ZQF 260046 FIELD 22A, 9C, 9+

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

SOUNDING SYSTEM STUDY

R. LEVITON

/65- /

DOD-AIR FORCE

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ZQF 260047 FIELD 1C

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

ROCKET SOUNDING PROGRAM DEVELOPMENT

R. LEVITON

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ZQF 260051 FIELD 8+, 9+,12A

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

RADAR WEATHER INSTRUMENTATION TECHNIQUES

H. J. SWEENEY

/65- /

DOD-AIR FORCE

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ZQF 260067 FIELD 12A,22C, 8E

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

DATA REDUCTION AND PROCESSING

R. S. HAWKINS

/65- /

DOD-AIR FORCE

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ZQF 260095 FIELD 19D,21I, 4A,15G

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

FIELD STUDIES OF CHEMICAL RELEASE TECHNIQUES

N. W. ROSENBERG

/65- /

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ZQF 260110 FIELD 4A, 9+, 9A

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

PROBE INSTRUMENTATION RESEARCH AND DEVELOPMENT

C. H. REYNOLDS

/65- /

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ZJA 820 FIELD 8F, 8H, 8+, 9+

USDI, GEOL SURV PHOENX, ARIZONA

LOW FREQUENCY RADAR TRACKING OF PRECIPITATION

H. E. SKIBITZKE, R. H. BROWN
G. M. ROBINSON

RMA-106-F
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INTERIOR-GEOLOGICAL SURVEY

05 BEHAVIORAL AND SOCIAL SCIENCES

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GSS 1226 FIELD 5A

THE MECHANICS OF DOMINGO DE SOTO

W. A. WALLACE, I. B. COHEN, J. E. MURDOCH
M. P. WALLACE

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8/65- 8/66

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ZQN 542137 1 FIELD 15+, 9+

USN, BUR NAV PERSON, SAN DIEGO, CALIFORNIA

DESIGN DEVELOPMENT AND EVALUATION OF EXPERIMENTAL TRAINING FOR ELECTRONICS

E. I. JONES, A. V. ANDERSON

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DOD-NAVY

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ZQN 542138 1 FIELD 15+, 9+

USN, BUR NAV PERSON, SAN DIEGO, CALIFORNIA

SURVEY OF INFORMATION ON ELECTRONICS TRAINING METHODS AND MATERIALS

A. V. ANDERSON, J. H. STEINEMANN

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ZQN 544204 1

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

STAFFING CRITERIA FOR CONSTRUCTION INSPECTION PERSONNEL

H. A. LEUPP

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ZJG 838 FIELD 8D,20L

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L. OBERT

INT-8M-6111511-3
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INTERIOR-BUREAU OF MINES

06 BIOLOGICAL AND MEDICAL SCIENCES

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10E 949 6 FIELD 11F

AMER DENTAL ASSN CHI, ILLINOIS

ALLOYS OF GALLIUM FOR USE IN DENTISTRY

R. M. WATERSTRAT, R. •. WATERSTRAT

4/66- 3/67

PHS-NIH-NATL INST DENTAL RESEARCH

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1NB 49e5 3 FIELD 6B, 9•, 9A, 9D

REDUNDANCY OF POTENTIAL COMMAND

W. S. MCCULLOCH, M. BLUM, R. M. DIAZ W. L. KILMER, S. PAPERT, C. P. SCHNABEL

12/65-11/66

PHS-NIH-NATL INST NEUROL DIS • BLINDNESS

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GSB 1457 1 FIELD 7D

CORNELL UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, NEW YORK

MASS SPECTROGRAPHIC STUDY OF ULTRATRACE ELEMENTS IN BIOLOGICAL MATERIALS

G. M. MORRISON

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2/66- 2/67

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GSB 2451 1 FIELD 7C

UNIV OF KENTUCKY, GRADUATE SCHOOL, CHEMISTRY, KENTUCKY

A NEW COUPLING METHOD IN PEPTIDE SYNTHESIS

M. J. KORNET

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ZQN 530371 1 FIELD 5E,10B

USN, WEAPON LAB DAHLGN, VIRGINIA

PERSONNEL ESCAPE PROPULSION SYSTEMS EVALUATION

A. R. POWELL

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ZQN 530582 FIELD 5E,10B

PERSONNEL ESCAPE PROPULSION SYSTEMS

A. R. POWELL

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ZJG 843 FIELD 6B, 9•, 5A

USDI, BUR MINES, PITTSBURGH, PENNSYLVANIA

NOISE LEVELS ASSOCIATED WITH SUPPLIED-AIR RESPIRATORS

R. H. SCHUTZ, B. I. FERBER, E. J. KLOOS J. A. LAMONICA

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INTERIOR-BUREAU OF MINES

07 CHEMISTRY

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1GM 10693 4 FIELD 7C, 7D, 7A,20J

UNIV OF PENNSYLVANIA, GRADUATE SCHOOL, CHEMISTRY, PENNSYLVANIA

MASS SPECTRAL AND ELECTRICAL DISCHARGE STUDIES

E. R. THORNTON, B. WANG

1/66-12/66

PHS-NIH-DIV GENERAL MEDICAL SCIENCES

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7ZA 204 3 FIELD 7C, 7D,20J

USDHEW BSS ENGIN CTR, SANI ENG CTR,CINCINNAI, OHIO

SEPARATION TECHNIQUES ON ORGANIC PARTICULATES

E. SAWICKI, E. D. BARBER, S. P. MCPHERSON F. W. STANLEY

BSS-B-2-3
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7ZX 217 3 FIELD 7C, 7A, 7D, 7B

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PHOTOCHEMICAL AND KINETIC INVESTIGATIONS

A. P. ALTSHULLER, J. J. BUFALINI I. R. COHEN, S. L. KOPCZYNSKI

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7ZX 218 3 FIELD 7C, 7D,20J, 7B

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AYALYTICAL METHODOLOGY ON ORGANIC PARTICULATES

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7ZX 219 3 FIELD 7C, 7D, 7A

USDHEW BSS ENGIN CTR, SANI ENG CTR,CINCINNAT, OHIO

POLYNUCLEAR HYDROCARBON AND RELATED COMPOUND ANALYSES

E. SAWICKI, W. C. ELBERT, J. E. MEEKER

BSS-B-2-1
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GSE 779 FIELD 7D

UNIV OF WASHINGTON, SCHOOL OF ENGINEERING, CHEMICAL ENGINEERING, WASHINGTON

THE ROLES OF THE INTERFACE AND OF SURFACE ACTIVE AGENTS ON MASS TRANSFER

W. J. HEIDEGER

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6/65- 6/66

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GSE 781 FIELD 7C, 7D

UNIVERSITY OF MICHIGAN, SCHOOL OF ENGINEERING, NUCLEAR ENGINEERING, MICHIGAN

NEUTRON INELASTIC SCATTERING FROM HIGH POLYMERS

G. C. SUMMERFIELD

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GSE 783 FIELD 7D,11G

UNIV OF TEXAS, AUSTIN, SCHOOL OF ENGINEERING, CHEMICAL ENGINEERING, TEXAS

THE INFLUENCE OF DISLOCATIONS ON CATALYTIC ACTIVITY

H. F. RASE

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5/65- 5/66

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GSE 784 FIELD 7A, 7D

UNIV OF WASHINGTON, SCHOOL OF ENGINEERING, CHEMICAL ENGINEERING, WASHINGTON

STUDIES OF CATION-EXCHANGE RATES IN PACKED BEDS

M. M. DAVID

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GSE 805 1 FIELD 7D

UNIV OF WISCONSIN, SCHOOL OF ENGINEERING, CHEMICAL ENGINEERING, WISCONSIN

THE DESIGN OF LARGE PROCESSING SYSTEMS

D. F. RUDD

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GSE 806 FIELD 7D, 7A

UNIV OF PENNSYLVANIA, SCHOOL OF ENGINEERING, BIOMEDICAL ENGINEERING,

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ULTRASONIC PROPERTIES OF PHASE TRANSITIONS IN LIQUIDS

P. D. EDMONDS

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GSE 873 FIELD 7A, 7D,20M

KINETICS OF HIGH-TEMPERATURE SOLID-STATE REACTIONS

S. F. HULBERT

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4/65- 4/66

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GSE 879 FIELD 7C, 7D

UNIVERSITY OF MICHIGAN, SCHOOL OF ENGINEERING, NUCLEAR ENGINEERING, MICHIGAN

NEUTRON INELASTIC SCATTERING IN HYDROCARBONS

J. S. KING

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4/65- 4/66

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GSP 673 5 FIELD 7C, 7D

OHIO STATE UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, OHIO

BORON HETEROCYCLES

S. G. SHORE

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GSP 927 3 FIELD 7C, 7D,20J, 7B

KANSAS ST UNIV AGR SCI, GRADUATE SCHOOL, CHEMISTRY, KANSAS

ASSOCIATED WATER IN CHELATE EXTRACTION

C. E. MELDAN

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3/66- 3/67

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GSP 1108 3 FIELD 7D,20J, 7B

UNIV OF CAL-L. A., GRADUATE SCHOOL, CHEMISTRY, CALIFORNIA

TRANSITION METAL CARBONYLS

H. D. KAESZ

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3/66- 3/67

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GSP 1192 1 1 FIELD 7D,20J,20L, 7B

UNIV OF WISCONSIN, GRADUATE SCHOOL, CHEMISTRY, WISCONSIN

STRUCTURAL STUDIES OF METAL CARBONYLS AND RELATED TRANSITION METAL COMPOUNDS

L. F. DAHL

NSF-GP-1573
7/64- 9/65

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GSP 2014 1 FIELD 7C, 7D,20J, 7B

WEST VIRGINIA UNIV, GRADUATE SCHOOL, CHEMISTRY, WEST VIRGINIA

NUCLEAR QUADRUPOLE COUPLING CONSTANTS

J. D. GRAYBEAL

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3/66- 3/67

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GSP 2018 1 FIELD 7C, 7D,20J

OREGON STATE UNIV, GRADUATE SCHOOL, CHEMISTRY, OREGON

COORDINATED PHOSPHORUS LIGANDS

J. T. YOKE

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GSP 2023 1 FIELD 7C, 7D, 7A,20M

ADAMS STATE COLLEGE, UNDERGRADUATE SCHOOL, CHEMISTRY, COLORADO

RAPID REACTIONS IN SOLUTION

K. D. WATKINS

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GSP 2027 1 FIELD 7C, 7D, 7A,12A

YALE UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, CONNECTICUT

STRUCTURAL, RATE AND EQUILIBRIUM PROPERTIES OF ORGANIC COMPOUNDS

M. SAUNDERS

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3/66- 3/67

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GSP 2031 1 FIELD 7C, 7D,20J

UNIVERSITY OF DETROIT, GRADUATE SCHOOL, CHEMISTRY, MICHIGAN

LONG-PATH INFRA-RED SPECTROSCOPY

P. SIGAL

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3/66- 3/67

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GSP 2050 1 FIELD 7C,20J,20F, 7B

UNIV OF NOTRE DAME, GRADUATE SCHOOL, CHEMISTRY, INDIANA

CHARACTERIZATION OF UNSTABLE SPECIES BY MASS SPECTROMETRY

F. P. FEHLNER

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3/66- 3/67

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GSP 2052 1 FIELD 7C, 7D,20J

CANISIUS COLLEGE, GRADUATE SCHOOL, CHEMISTRY, NEW YORK

STEREOCHEMISTRY OF ELECTROREDUCTIONS

R. ANNINO, R. E. ERICKSON

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3/66- 3/67

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GSP 2059 1 FIELD 7C, 7D,20J, 7B

RICE UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, TEXAS

MICROWAVE SPECTRA AT MILLIMETER WAVELENGTHS

R. F. CURL

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3/66- 3/67

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GSP 2163 FIELD 7D

SAN DIEGO STATE COLL, GRADUATE SCHOOL, CHEMISTRY, CALIFORNIA

SEPARATION OF SUBSTITUENT FIELD AND INDUCTIVE EFFECTS

E. J. GRUBBS

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6/65- 6/66

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GSP 2200 FIELD 7C

UNIVERSITY OF OKLAHOMA, GRADUATE SCHOOL, CHEMISTRY, OKLAHOMA

CYCLODECAPENTAENES AND 9,10- D IHYDRONAPHTHALENES

J. J. BLOOMFIELD

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6/65- 6/66

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GSP 2236 FIELD 7D

UNIVERSITY OF ILLINOIS, GRADUATE SCHOOL, CHEMISTRY, ILLINOIS

REACTION OF COMPLEXES

J. C. BAILAR

NSF-GP-191-A1
9/62- 9/63

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GSP 2244 FIELD 7C,20J,20L

BRANDEIS UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, MASSACHUSETTS

CRYSTAL AND MOLECULAR STRUCTURES OF

ORGANIC COMPOUNDS

T. N. MARGULIS

NSF-GP-4550
5/65- 5/66

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GSP 2258 FIELD 20J

PURDUE UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, INDIANA

INTRAMOLECULAR ENERGY TRANSFER

H. MORRISON

NSF-GP-4511
6/65- 6/66

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GSP 2393 FIELD 7D, 5A, 7B

MOLECULAR ADSORPTION PHENOMENA

R. G. GREENLER

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4/65- 4/66

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GSP 2433 FIELD 20J, 5A

UNIVERSITY OF OKLAHOMA, GRADUATE SCHOOL, PHYSICS, OKLAHOMA

PRESSURE BROADENED LINE WIDTHS IN MICROWAVE SPECTROSCOPY

C. C. LIN

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GSP 2455 FIELD 7A,20M, 5A

LEHIGH UNIVERSITY, GRADUATE SCHOOL, PHYSICS, PENNSYLVANIA

GASEOUS CHEMICAL KINETICS AND CONDENSATION PROCESSES

W. R. SMITH, J. DAEN

NSF-GP-4427
4/65- 4/66

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GSP 2461 FIELD 20J

UNIV OF WISCONSIN, GRADUATE SCHOOL, CHEMISTRY, WISCONSIN

ESR HYPERFINE INTERACTIONS

J. E. HARRIMAN

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5/65- 5/66

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GJE 91 2 FIELD 7C, 7A, 7D, 7B

CASE INST OF TECHNOL, GRADUATE SCHOOL, CHEMISTRY, OHIO

HETEROGENEOUS NUCLEATION AND CONDENSATION OF VAPORS

A. G. WALTON, E. BAER, J. KOUTSKY

SW-14-01-0001-388
3/66- 2/67

INTERIOR-OFFICE OF SALINE WATER

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GJE 152 FIELD 7D,20J

STATE UNIV N Y STONY, GRADUATE SCHOOL, CHEMISTRY, NEW YORK

STUDIES OF THE PHYSICAL CHEMISTRY OF ELECTROLYTE SOLUTIONS

H. FRIEDMAN, A. BENNAIM, J. RASAIAH

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INTERIOR-OFFICE OF SALINE WATER

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GYE 810037 1 FIELD 7C, 7A, 7D, 7B

MIN OF IND + COM MILAN, ITALY

EFF. OF CATALYSIS ON FATTY ESTERS FROM SOYBEAN + LINSEED OILS

G. JACINI

AGF-E15-UR-0046
3/66- 2/67

AGRICULTURE-DEPT OF AGRICULTURE

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NG 35 1 FIELD 7C, 7D, 7A, 7B

PURDUE UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, INDIANA

KINETICS AND MECHANISM OF ELECTRO-OXIDATION OF ASCORBIC ACID

S. P. PERONE, W. KRETLOW

7/65- 7/66

PURDUE UNIVERSITY

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NIL 170 FIELD 7C, 7D,11F,11G

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, MIN METAL + PETROL ENG, ILLINOIS

INITIAL GRANT FROM UNIVERSITY RESEARCH BOARD FOR EQUIPMENT HIGH TEMPERATURE OXIDATION IN ELECTRIC FIELD

W. H. BRUCKNER

/65- /

ILLINOIS, UNIVERSITY OF

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PCS 357 FIELD 20J, 7B

UNIV OF PENNSYLVANIA, GRADUATE SCHOOL, CHEMISTRY, PENNSYLVANIA

A STUDY OF COVALENCY IN METAL ION LIGAND

B. B. WAYLAND

226-G
9/65- 8/66

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PCS 360 FIELD 7C, 7A, 7D

MECHANISM OF ELECTROPHILIC SUBSTITUTION OF METALLOCENES

R. W. FISH

237-G
9/65- 8/66

PETROLEUM RESEARCH FUND-AMER CHEM SOC

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PCS 362 FIELD 7D,20M

HEATS OF REACTION BY THERMOCOULOMETRY

C. H. SPINK

250-G
9/65- 8/66

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PCS 363 FIELD 7C

HOPE COLLEGE, UNDERGRADUATE SCHOOL, CHEMISTRY, MICHIGAN

SOME ASPECTS OF THE CHEMISTRY OF CYCLOPROPYLPHENYL CARBINOL

D. C. NECKERS

252-G
9/65- 8/66

PETROLEUM RESEARCH FUND-AMER CHEM SOC

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PCS 365 FIELD 7C, 7B

UNIV OF SOUTH DAKOTA, GRADUATE SCHOOL, CHEMISTRY, SOUTH DAKOTA

CHEMISTRY OF CYCLIC SILICON NITROGEN COMPOUNDS

N. E. MILLER

269-G
9/65- 8/66

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PCS 366 FIELD 7C

CASE INST OF TECHNOL, GRADUATE SCHOOL, CHEMISTRY, OHIO

THE CYCLOPROPENYL ANION

M. POMERANTZ

271-G
9/65- 8/66

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PCS 369 FIELD 7C, 7A

UNIVERSITY OF ARIZONA, GRADUATE SCHOOL, CHEMISTRY, ARIZONA

ESTER CARBONYL REACTIVITIES

L. B. JONES

284-G
9/65- 8/66

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PCS 370 FIELD 7C

AN ALKYL SUBSTITUTED TRISHOMOCYCLOPROPENYL CATION

J. W. LOWE

297-G
9/65- 8/66

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PCS 371 FIELD 7C, 7D

ILLINOIS INST OF TECH, GRADUATE SCHOOL, CHEMISTRY, ILLINOIS

HIGH TEMPERATURE PYROLYSIS AND OXIDATION OF HYDROCARBONS STUDIES WITH A SHOCK TUBE AND MASS SPECTROMETER

D. GUTMAN

305-G
9/65- 8/66

PETROLEUM RESEARCH FUND-AMER CHEM SOC

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PCS 372 FIELD 7C,20J

UNIV OF ROCHESTER, GRADUATE SCHOOL, CHEMISTRY, NEW YORK

TRIPLET-TRIPLET ANNIHILATION AND DELAYED FLUORESCENCE IN CRYSTAL-LINE BENZENE

G. C. NEIMAN

308-G
9/65- 8/66

PETROLEUM RESEARCH FUND-AMER CHEM SOC

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PCS 374 FIELD 7C, 7D

TERMINAL BENZOYLATIONS OF CERTAIN POLYKETONES

M. L. MILLS

317-G
9/65- 8/66

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PCS 375 FIELD 7C, 7A, 7D

MICHIGAN STATE UNIV, GRADUATE SCHOOL, CHEMISTRY, MICHIGAN

KINETIC ISOTOPE EFFECTS AND MECHANISM OF THERMAL REACTIONS OF SMALL RING COMPOUNDS

L. B. SIMS

320-G
9/65- 8/66

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PCS 376 FIELD 7C, 7D

WEST VIRGINIA UNIV, GRADUATE SCHOOL, CHEMISTRY, WEST VIRGINIA

REACTIONS OF ETHYL AZODICARBOXYLATE WITH ALKYLANTHRACENES

C. G. MCCARTY

335-G
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PCS 377 FIELD 7C

VIRGINIA POLYTECH INST, GRADUATE SCHOOL, CHEMISTRY, VIRGINIA

FORMATION AND REACTIONS OF MULTIPLE ANIONS

J. F. WOLFE

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PCS 378 FIELD 20J

GEORGIA INST OF TECH, GRADUATE SCHOOL, CHEMISTRY, GEORGIA

ATOMIC AND MOLECULAR WAVEFUNCTIONS CONSTRUCTED FROM POLYNOMIAL-TYPE ORBITALS

B. M. GIMARC

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PCS 379 FIELD 7A, 7D

UNIVERSITY OF HAWAII, GRADUATE SCHOOL, CHEMISTRY, HAWAII

MECHANISMS OF ACID CATALYSIS IN MIXED AQUEOUS SOLVENTS

L. L. SCHALEGER

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PCS 380 FIELD 7A,20M

GEORGETOWN UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, DIST OF COLUMBIA

THERMODYNAMICS OF SOLUTIONS - SOLUTE ACTIVITY COEFFICIENTS AND SURFACE EXCESS CONCENTRATIONS

D. E. MARTIRE

356-G
9/65- 8/66

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PCS 381 FIELD 7D

UNIV OF WASHINGTON, SCHOOL OF ENGINEERING, CHEMICAL ENGINEERING, WASHINGTON

THE EFFECT OF SURFACE ACTIVE AGENTS ON THE PERFORMANCE OF DISTILLATION EQUIPMENT

J. C. BERG

353-G
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PCS 382 FIELD 7C, 7D, 7B

WASHINGTON STATE UNIV, GRADUATE SCHOOL, CHEMISTRY, WASHINGTON

SECONDARY DEUTERIUM ISOTOPE EFFECTS IN ALLYLIC REARRANGEMENTS

K. D. MCMICHAEL

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PCS 383 FIELD 7A, 7D, 7B

UNIV OF CAL-L. A., GRADUATE SCHOOL, CHEMISTRY, CALIFORNIA

THE KINETICS OF SOME GAS-PHASE REACTIONS OF NITROGEN TRIOXIDE

E. W. GRAHAM

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PCS 384 FIELD 7C, 7D

UNIVERSITY OF KANSAS, GRADUATE SCHOOL, CHEMISTRY, KANSAS

THE SYNTHESIS OF THE DEWAR AND LADENBURG BENZENE SYSTEMS

R. G. CARLSON

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PCS 385 FIELD 7C, 7B

STERIC AND POLAR CONTRIBUTIONS TO SECONDARY DEUTERIUM ISOTOPE EFFECTS

J. G. JEWETT

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PCS 386 FIELD 7C, 7D

HOWARD UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, DIST OF COLUMBIA

SYNTHESIS OF OXEPINE

J. W. WHEELER

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PCS 387 FIELD 7C, 7D, 7A, 7B

A KINETIC STUDY OF THE AQUATION AND BASE HYDROLYSIS OF SOME POLYMETHYLENEDIAMINE BRIDGED CHLOROPENTAAMINE COBALT COMPLEXES

W. D. ALEXANDER

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PCS 388 FIELD 7D

GEOMETRIC EFFECTS IN FLAME SPECTROMETRY

J. A. HOWELL

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PCS 389 FIELD 7C, 7D

THE INVESTIGATION OF THE ROLE OF CARBANION INTERMEDIATES IN THE HOFMANN ELIMINATION REACTION

F. J. KAKIS

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PCS 390 FIELD 7C, 7D, 7B

INFRARED SPECTRA OF SELECTED ANIONS IN KBR DISKS WHICH HAVE BEEN HEATED

D. L. POWELL

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PCS 392 FIELD 7C, 7D

PHOTOCHEMISTRY OF THIOKETONES

C. J. MICHEJDA

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PCS 394 FIELD 7C, 7D

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THE PRIMARY KINETIC ISOTOPE EFFECT AND HYDRIDE TRANSFERS

A. J. ROSEN

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PCS 396 FIELD 7D,20J

SEPARATION OF OPTICAL ISOMERS BY GAS CHROMATOGRAPHY

J. D. STOFFER

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PCS 397 FIELD 7D, 7B

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PHOTOCHEMISTRY OF METAL CARBONYL COMPLEXES

D. A. JOHNSON

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PCS 398 FIELD 7D

THE CHRONOPOTENTIOMETRIC AND CHRONOAMPEROMETRIC MEASUREMENT OF DIFFUSION COEFFICIENTS WITH SHIELDED ELECTRODES

J. F. ZIMMERMAN

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PCS 399 FIELD 7C, 7D,20J

THE DETERMINATION OF THE STRUCTURES OF SOME CYCLIC HYDROCARBONS BY MICROWAVE SPECTROSCOPY

S. S. BUTCHER

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PCS 400 FIELD 7D,20J

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THE DECOMPOSITION OF EXCITED IONS

J. H. CURRENT

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PCS 401 FIELD 7C,20J, 7B

BRANDEIS UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, MASSACHUSETTS

THE ELECTRONIC ENERGY LEVELS OF THE FREE RADICALS SIH, SIH2, AND SIH3

P. C. JORDAN

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PCS 402 FIELD 7C, 7D, 7B

STABILITY OF THE CARBONIUM ION INTERMEDIATE UPON PRODUCT FORMATION IN THE NITROUS ACID DEAMINATION OF PRIMARY ALIPHATIC AMINES

J. R. MOHRIG

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PCS 403 FIELD 7A, 7D

HOWARD UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, DIST OF COLUMBIA

SOLVATION, KINETICS AND EQUILIBRIUM STUDIES OF ACID-BASE REACTIONS IN NONAQUEOUS SYSTEMS

E. PRICE

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PCS 405 FIELD 7C, 7D

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EFFECTS OF SOLVENTS AND ELECTROLYTES ON ACID-BASE, SOLVOLYSIS, AND OTHER REACTIONS

M. S. TRAHANOVSKY

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PCS 408 FIELD 7D, 7B

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LIGAND SUBSTITUTION REACTIONS IN LANTHANIDE METAL COMPLEXES

J. L. BEAR

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PCS 410 FIELD 7A, 7D

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ENGINEERING KINETICS OF POLYMERIZATION REACTIONS

R. L. LAURENCE

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PCS 423 FIELD 7C, 7D

YALE UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, CONNECTICUT

THE CONDENSATION OF ACETOACETIC ESTER WITH ALPHA, BETA-UNSATURATED ALDEHYDES

F. E. ZIEGLER

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PCS 432 FIELD 7C, 7D

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PREPARATION OF NOVEL ORGANIC CLATHRATE COMPOUNDS DERIVED FROM FERROCENE

J. F. KEANA

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CHEMISTRY OF HYDROCARBON-TRANSITION METAL COORDINATION COMPOUNDS

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PCS 446 FIELD 7C, 7D,20J

STUDY OF VALENCE-SHELL EXPANSION IN PHOTOEXCITED STATES OF AROMATIC SULFUR, PHOSPHORUS AND SILICON COMPOUNDS

E. L. WEHRY

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PCS 447 FIELD 7A, 7D

UNIV OF NEW HAMPSHIRE, GRADUATE SCHOOL, CHEMISTRY, NEW HAMPSHIRE

STUDIES OF THE SN2 REACTION

J. J. UEBEL

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PCS 448 FIELD 7C, 7D

ELECTRON TRANSFER REACTIONS OF RADICAL ANIONS

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PCS 451 FIELD 7D

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STUDIES OF MEISENHEIMER COMPLEXES BY NMR SPECTROSCOPY

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PCS 454 FIELD 7C, 7D, 7A, 7B

UNIVERSITY OF WYOMING, GRADUATE SCHOOL, CHEMISTRY, WYOMING

THE SECONDARY ISOTOPE EFFECT OF GAMMA DEUTERIUM ON REACTION RATES

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PCS 457 FIELD 7C, 7D

REACTIVITY OF UNSATURATED ALKOXY RADICALS

P. J. WAGNER

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PCS 458 FIELD 20J, 7B

THE MOLECULAR STRUCTURE OF HEXAMINO COBALT AND RELATED METAL AMMINES

D. S. KLETT

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PCS 462 FIELD 7C, 7D

MICHIGAN STATE UNIV, GRADUATE SCHOOL, CHEMISTRY, MICHIGAN

NONISOTHERMAL TRANSPORT IN MULTICOMPONENT SYSTEMS

F. M. HORNE

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PCS 464 FIELD 7D, 7A

BOSTON COLLEGE, GRADUATE SCHOOL, CHEMISTRY, MASSACHUSETTS

PHOTO-POLAROGRAPHIC BEHAVIOR OF IRREVERSIBLY REDUCED INORGANIC DEPOLARIZERS

R. A. DURST

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PCS 466 FIELD 7C,20J

CONFORMATIONAL ANALYSIS AND EQUILIBRIA IN 1,3-DIOXANES

R. M. COATES

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PCS 467 FIELD 7D, 7B

A STUDY OF COMPLEXES OF GOLD - II

J. H. WATERS

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PCS 469 FIELD 7C, 7D, 7B

PREPARATION OF SOME PHOSPHORUS-BORON CONTAINING ANIONS

J. W. GILJE

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PCS 471 FIELD 7C, 7A, 7D

MECHANISMS OF SOLVOLYSIS OF TOLUENESULFONATE ESTERS

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PCS 472 FIELD 20J

INTERMOLECULAR FORCES

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BRIDGED BICYCLIC DERIVATIVES BY HOMOALLYLIC REARRANGEMENT

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PCS 474 FIELD 7C, 7D,20J

THE PREPARATION OF 2-CARBOXY-6-SUBSTITUTED SPIRO HEPTANES AND THE DETERMINATION OF THEIR DISSOCIATION CONSTANTS

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PCS 475 FIELD 7C, 7D

REACTIONS OF OLEFINS IN DIMETHYL SULFOXIDE - A STUDY OF THE SOLVENT ASSISTED REACTION OF N-HALOSUCCINIMIDES WITH OLEFINS

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PCS 477 FIELD 7C, 7D,20J

A STUDY OF MOLECULAR ORBITAL INFLUENCES IN THERMAL METHYLENECYCLOPROPANE ISOMERIZATIONS

L. B. RODEWALD

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AN INVESTIGATION OF THE CHEMISTRY OF SUBSTITUTED METHYLENIMINE RADICALS AND CATIONS

R. N. LOEPPKY

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PCS 479 FIELD 20J

THE CALCULATION OF INTERMOLECULAR FORCES AT INTERMEDIATE RANGES

W. A. SANDERS

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PCS 480 FIELD 7D,20J

BONDING IN SQUARE-PLANAR COMPLEXES

J. W. CARMICHAEL

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PCS 486 FIELD 20J, 7B

THE H-FUNCTION FOR THE AMMONIA-WATER SYSTEM

A. MACDONALD

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UT 551 FIELD 7D, 7B

UNIV OF NEW HAMPSHIRE, GRADUATE SCHOOL, CHEMISTRY, NEW HAMPSHIRE

CHEMICAL EFFECTS OF PURE BETA DECAY

C. W. OWENS

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RESEARCH CORP-WILLIAMS-WATERMAN FUND

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UT 552 FIELD 7D, 5A,18A,20L

ADDITIVE COLORATION

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ZPE 1336 FIELD 7C, 7D

LARGE-SCALE CHEMICAL SYNTHESIS OF THE A- AND B- CHAINS OF INSULIN AND ISOLATION OF SYNTHETIC INSULIN

P. G. KATSOYANNIS, J. GINAS, G. SCHWARTZ M. TILAK, A. TOMETSKO

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AEC-BIOLOGY + MEDICINE

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ZOA 208 FIELD 7C, 7D,11G, 7B

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

SYNTHESIS OF POLYOXYPROPYLENE TERPOLYMERS

E. SPEARMAN

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ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

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ZQF 260008 FIELD 7C, 7D,20M,11G

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

PHYSICAL CHEMISTRY OF ELECTROMAGNETIC MATERIALS

B. RUBIN

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DOD-AIR FORCE

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ZQF 284613 FIELD 7C,21B,21D, 7D

USAF, ARNOLD AFS, TENNESSEE

COMBUSTION IN HIGH VELOCITY DIFFUSIVE FLOW

R. P. RHODES

AF-40-600-01000
/65- /

DOD-AIR FORCE

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ZQF 284681 4 FIELD 7C, 7D,20M, 7E

USAF, AFSC, RTD, WRIGHT-PATT-AF MAT LAB, OHIO

ORGANOMETALLIC RESEARCH

H. ROSENBERG

/65- /

DOD-AIR FORCE

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ZQF 284686 3 FIELD 7C, 7D,20M,20J

USAF, AFSC, RTD, WRIGHT-PATT-AF MAT LAB, OHIO

PHYSICAL CHEMISTRY OF HIGH POLYMERS

I. J. GOLDFARB

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DOD-AIR FORCE

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ZQF 284795 2 FIELD 7D, 7C,12A, 7B

USAF, AF ACADEMY, ACADEMY, COLORADO

AN INVESTIGATION OF THE SYSTEM NB2O5-SC2O3

W. E. SCHAEFER

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DOD-AIR FORCE

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ZUE 2 FIELD 7A, 7D,20M,11G

US, AEC, ORNL, ONAL LAB, TENNESSEE

WATER RESEARCH PROGRAM

K. A. KRAUSE

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INTERIOR-OFFICE OF SALINE WATER

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ZUG 855 FIELD 7C,21D, 7D

USDI, BUR MINES, DIST OF COLUMBIA

ULTRA-HIGH PRESSURE REACTIONS

R. W. MITCHUE, P. DOBRANSKY, S. FRIEDMAN J. R. SALMON

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INTERIOR-BUREAU OF MINES

08 EARTH SCIENCES AND OCEANOGRAPHY

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USDHEW, BSS, N-WEST, SHELLFISH SANI RES CTR, WASHINGTON

OCEANOGRAPHIC METHODS

P. S. KELLEY

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PHS-BSS

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USDC, COAST + GEOD SUR, ROCKVILLE, MARYLAND

ALEUTIAN ISLAND SEISMIC EXPERIMENT

D. TOCHER

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DEFENSE-ADVANCED RES PROJECTS AGENCY

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GSB 540 1 FIELD 8D, 8G

BRIGHAM YOUNG UNIV, GRADUATE SCHOOL, GEOLOGY, UTAH

A LOWER ORDOVICIAN STANDARD SECTION FOR NORTH AMERICA

L. F. HINTZE, D. L. CLARK, R. H. FLOWER J. H. JOHNSON, J. K. RIGBY

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2/66- 2/67

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WILLIAMS COLLEGE, UNDERGRADUATE SCHOOL, BIOLOGY, MASSACHUSETTS

LATE-PLEISTOCENE VEGETATION AND CLIMATE

D. R. WHITEHEAD

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MAMMALIAN AND ASSOCIATED VERTEBRATE FOSSIL REMAINS FROM TERRESTRIAL ROCKS OF LOWER CRETACEOUS AGE

B. H. SLAUGHTER

NSF-GB-3805
8/65- 8/66

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BERMUDA BIOL STATION, BERMUDA

MARINE BIOLOGY RESEARCH AT THE BERMUDA BIOLOGICAL STATION

W. H. SUTCLIFFE

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UNIV OF CAL-BERKELEY, GRADUATE SCHOOL, PALEONTOLOGY, CALIFORNIA

BIOSTRATIGRAPHY AND CHRONOLOGY OF THE UPPER TERTIARY AND LOWER QUATERNARY NONMARINE ROCKS IN ITALY AND SOUTHERN FRANCE

D. E. SAVAGE, G. H. CURTIS

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SUPPORT OF BOAT OPERATIONS

P. L. PARKER

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GSB 4389 FIELD 8H

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COORDINATION OF R/V ANTON BRUUN - S OUTHEASTERN PACIFIC BIOLOGICAL OCEANOGRAPHIC PROGRAMS

E. CHIN

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GSB 4391 FIELD 8D, 8G

STUDIES OF PLANTS IN COAL BALLS OF LOWER PENNSYLVANIAN AGE FROM EASTERN KENTUCKY

T. N. TAYLOR

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GSH 4395 FIELD 8D, 8F

TRIASSIC ICHTHYOSAURUS

C. L. CAMP, C. W. CAMP

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GSE 752 FIELD 13B, 8K

UNIV OF CAL-BERKELEY, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, CALIFORNIA

SOIL BEHAVIOR DURING EARTHQUAKES

H. B. SEED

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GSE 753 FIELD 13B,12A

UNIV OF WISCONSIN, SCHOOL OF ENGINEERING, ENGINEERING MECHANICS, WISCONSIN

PROPERTIES OF CLAY SOILS

R. W. CHRISTENSEN

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GSE 760 FIELD 13B

RENSSELAER POLYTC INST, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, NEW YORK

CONSOLIDATION AND SECONDARY COMPRESSION OF CLAY

R. L. SCHIFFMAN

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GSE 802 1 FIELD 8H,20D

COLORADO STATE UNIV, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, COLORADO

INTERACTION BETWEEN WIND AND OPEN CHANNEL FLOW

E. J. PLATE

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3/66- 3/67

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GSE 902 FIELD 13B

CASE INST OF TECHNOL, SCHOOL OF ENGINEERING, ENGINEERING, OHIO

STRESS-STRAIN-TIME RELATIONS IN UNDRAINED SATURATED COHESIVE SOILS

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GSP 420 3 FIELD 8G

PENNSYLVANIA ST UNIV, GRADUATE SCHOOL, GEOLOGY, PENNSYLVANIA

CHARACTERISTICS OF MODERN ORGANIC SEDIMENTS

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GSP 1278 1 FIELD 8C

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GSP 1334 2 FIELD 8N, 8G, 4A

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GSP 1387 2 FIELD 8K, 8G, 8C

COLUMBIA UNIVERSITY, GRADUATE SCHOOL, GEOLOGY, NEW YORK

COMPREHENSIVE STUDY OF DEEP EARTHQUAKES

J. OLIVER, B. ISACKS

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GSP 1439 2 FIELD 8D, 8G

UNIVERSITY OF ILLINOIS, GRADUATE SCHOOL, GEOLOGY, ILLINOIS

STRATIGRAPHY, CLASSIFICATION AND CORRELATION OF EARLY WISCONSIN AND PRE-WISCONSIN TILLS, ALLEGHENY PLATEAU

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GSP 1446 2 FIELD 8F

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SOURCES, MOVEMENT, AND DISTRIBUTION OF SEDIMENT IN A SMALL WATERSHED

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GSP 1717 2 FIELD 8F, 8H, 8G

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INFLUENCE OF GEOLOGY ON STORAGE AND WITHDRAWAL OF GROUND WATER AND CONCURRENT LAND SUBSIDENCE

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GSP 2102 FIELD 7C, 7D, 8D, 8G

YALE UNIVERSITY, GRADUATE SCHOOL, GEOLOGY, CONNECTICUT

HIGH TEMPERATURE CATION EXCHANGE BETWEEN MINERALS AND FLUIDS

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GSP 2105 FIELD 8D, 8G, 7B

UNIV OF CAL-LA JOLLA, GRADUATE SCHOOL, EARTH SCIENCES, CALIFORNIA

OXYGEN ISOTOPE EQUILIBRATION DURING HYDROTHERMAL GROTH OF SINGLE CRYSTALS OF QUARTZ AND FELDSPAR

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GSP 2114 FIELD 8F, 8G, 8H

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SEDIMENTATION, MORPHOLOGY AND STRUCTURE OF SMALL PORTIONS OF THE MID-ATLANTIC RIDGE

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GSP 2120 FIELD 8F

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GSP 2124 1 FIELD 13B, 8D, 8G

UNIV OF WISCONSIN, SCHOOL OF AGRICULTURE, SOIL SCIENCE, WISCONSIN

IONIC FACTORS AFFECTING THE ORIGIN OF EXPANSIBLE CLAY MINERALS IN SOILS

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GSP 2126 1 FIELD 13B

TEXAS A + M UNIVERSITY, SCHOOL OF AGRICULTURE, SOIL + CROP SCIENCE, TEXAS

PREDICTING SOLUTE MOVEMENT AND DISTRIBUTION IN SOILS

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GSP 2127 1 FIELD 8D, 8G

STANFORD UNIVERSITY, GRADUATE SCHOOL, GEOLOGY, CALIFORNIA

MINERALOGY, GEOCHEMISTRY, AND GENESIS OF THE IRON ORE DEPOSITS OF CHILE AND PERU

C. F. PARK

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GSP 2128 1 FIELD 8D, 8G

PENNSYLVANIA ST UNIV, SCHOOL OF MINERAL IND, FUEL TECHNOLOGY, PENNSYLVANIA

GEOCHEMISTRY OF COAL LITHOTYPES

M. SPACKMAN, R. R. DUTCHER
M. M. SPACKMAN, F. J. VASTOLA
P. L. WALKER

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GSP 2129 FIELD 8D, 8G

UNIVERSITY NEW MEXICO, GRADUATE SCHOOL, GEOLOGY, NEW MEXICO

CLIMATIC CYCLES AND PATTERNS IN VARVED SEDIMENTS-CASTILE PROJECT

R. Y. ANDERSON, E. F. CRUFT

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GSP 2130 FIELD 7D, 7B

UNIV OF CINCINNATI, GRADUATE SCHOOL, GEOLOGY, OHIO

SOLUBILITY OF ZIRCON

L. H. LARSEN

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GSP 2132 1 FIELD 8G

PETROLOGIC INTERPRETATIONS OF MINERALS FROM IGNEOUS AND METAMORPHIC ROCKS

H. C. LIESE

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GSP 2134 1 FIELD 8D, 8G, 8H

WOODS HOLE OCEANOGRAPH, MASSACHUSETTS

COMPARATIVE GEOCHEMICAL STUDIES OF THE MAJOR ORGANIC CONSTITUENTS IN OCEAN WATERS AND SEDIMENTS

J. M. HUNT

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GSP 2166 1 FIELD 8K, 8G

UNIVERSITY OF ALASKA, GRADUATE SCHOOL, GEOPHYSICAL INST, ALASKA

SEISMIC AND VOLCANIC INVESTIGATION IN THE KATMAI NATIONAL MONUMENT

E. BERG

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GSP 2184 1 FIELD 8D, 8G, 8H

BERMUDA BIOL STATION, BERMUDA

EFFECTS OF SILICATE MINERALS ON OCEAN WATER COMPOSITION

R. M. GARRELS, R. T. GARRELS

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GSP 2212 1 FIELD 8F, 8H

UNIV NATL OF MEXICO, MEXICO

STUDIES IN COASTAL LAGOONS

G. P. SALAS

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GSP 2213 1 FIELD 8D, 8G

MASS INST OF TECHNOL, GRADUATE SCHOOL, GEOLOGY + GEOPHYSICS, MASSACHUSETTS

PARTITION OF ELEMENTS AMONG COEXISTING MINERALS

M. H. DENNEN

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GSP 2521 1 FIELD 8H

UNIVERSITY OF HAWAII, GRADUATE SCHOOL, GEOPHYSICS, HAWAII

LOW-FREQUENCY SURFACE WAVES IN THE PACIFIC OCEAN

G. W. GROVES

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GSP 2542 FIELD 8G, 8E,12A

STANFORD UNIVERSITY, GRADUATE SCHOOL, GEOLOGY, CALIFORNIA

MATHEMATICAL SIMULATION OF CYCLIC SEDIMENTATION

J. W. HARBAUGH

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GSP 2547 FIELD 8D, 8G

UNIVERSITY OF OREGON, GRADUATE SCHOOL, CHEMISTRY, OREGON

CONTAMINANTS IN QUARTZ

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GUW 331 FIELD 13G,13B, 8H,20D

UNIVERSITY OF IDAHO, GRADUATE SCHOOL, WATER RESOURCES, IDAHO

MOVEMENT OF WATER FROM CANALS TO A GROUNDWATER TABLE

G. L. BLOOMSBURG, G. E. BLOOMSBURG
C. E. BROCKWAY

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INTERIOR-OFFICE OF WATER RESOURCES

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GUW 372 FIELD 7D, 7A,20M, 8D

UNIV OF MASSACHUSETTS, GRADUATE SCHOOL, CHEMISTRY, MASSACHUSETTS

THERMODYNAMIC RELATIONSHIPS WITHIN THE SYSTEM SEDIMENT-WATER-AIR

D. T. ZAJICEK

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GUW 384 FIELD 13G,20D

UNIV OF CAL-DAVIS, SCHOOL OF AGRICULTURE, IRRIGATION, CALIFORNIA

THE MECHANICS OF OPEN-CHANNEL FLOW

SYSTEMS

J. AMOROCHO, T. S. STRELKOFF

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GUW 398 FIELD 13G,20D

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, ILLINOIS

BASIC STUDY OF JET FLOW PATTERNS RELATED TO STREAM AND RESERVOIR BEHAVIOR

W. H. MAXWELL, H. PAZWASH

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GUW 400 FIELD 13G

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, MIN METAL + PETROL ENG, ILLINOIS

FURTHER STUDY OF AQUIFER PERFORMANCE

W. D. ROSE, H. FAKA, H. O. PFANNKUCH B. SINGH

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GUW 406 FIELD 13G

UNIVERSITY OF ARKANSAS, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, ARKANSAS

QUANTITATIVE ANALYSIS OF STREAM FLOW RATE EXTREMES

L. R. BEIPLE, H. M. JEFFUS

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GUW 407 FIELD 7D,20D, 7B

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, ILLINOIS

INFLUENCE OF TURBULENCE ON SURFACE REAERATION

E. R. HOLLEY

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GUW 409 FIELD 8H, 8G

LOUISIANA ST UNIV A+M, GRADUATE SCHOOL, GEOLOGY, LOUISIANA

STUDY OF MEASURES TO BE TAKEN TO ACCOMPLISH PROTECTION OF THE GROUND-WATER SUPPLY OF THE BATON ROUGE AREA FROM DEGRADATION

C. O. DURHAM, R. G. KAZMANN
J. D. MARTINEZ

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GUW 411 FIELD 8H

LOUISIANA ST UNIV A+M, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, LOUISIANA

STUDY OF MEASURES TO BE TAKEN TO ACCOMPLISH PROTECTION OF THE GROUND-WATER SUPPLY OF THE BATON ROUGE AREA FROM DEGRADATION

R. G. KAZMANN, C. O. DURHAM, G. W. HARDY B. F. SLIGER

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GUW 417 FIELD 13G, 8H,12A, 8E

WASHINGTON STATE UNIV, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, WASHINGTON

DETERMINATION OF FLOWS FOR UNGAGED STREAMS

D. L. BENDER, D. L. SCHREIBER

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GYE 120065 3 FIELD 13B

UNIVERSITY OF ILLINOIS, AGRICULTURAL EXPT STA, AGRONOMY, ILLINOIS

MOISTURE CONDITIONS + WATER TRANSPORT IN SOILS

A. KLUTE

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7/65- 6/66

AGRICULTURE-DEPT OF AGRICULTURE

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NAZ 18 1 FIELD 8H, 8E,12A

UNIVERSITY OF ARIZONA, GRADUATE SCHOOL, GEOLOGY, ARIZONA

ELECTRICAL ANALOGUE ANALYSIS OF THE TUCSON GROUNDWATER BASIN

D. E. PETERSON

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ARIZONA, UNIVERSITY OF

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NIL 171 FIELD 8G, 8D,12A, 8E

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, MIN METAL + PETROL ENG, ILLINOIS

ROCK MECHANICS RESEARCH

F. D. WRIGHT, P. H. LU, M. B. MIRZA

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YIL 189 2 FIELD 13B, 8D, 8H, 8G

STATE, GEOL SURV URBNA, ILLINOIS

GROUND-WATER GEOLOGY OF DEKALB AND BOONE COUNTIES, ILLINOIS

J. P. KEMPTON

7/63- 1/66

STATE-ILLINOIS

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YIL 194 1 FIELD 8D, 8H, 8G

STATE, GEOL SURV URBNA, ILLINOIS

GROUND-WATER GEOLOGY OF NORTH PART, WESTERN ILLINOIS

J. E. BKUECKMANN

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STATE-ILLINOIS

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ZQF 260076 FIELD 17G, 3A, 3B

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

AEROSPACE GEODOSY APPLICATIONS

M. S. MUNF

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DOD-AIR FORCE

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ZQF 260157 FIELD 13B, 8N, 8G

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

BASIC RESEARCH ON FUNDAMENTAL EARTH CONSTANTS

R. M. PERRY

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DOD-AIR FORCE

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ZQF 260172 FIELD 8D, 8G,20L

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

MINERAL PROPERTIES AND BEHAVIOR

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ZIA 231 1 FIELD 8D

US, SMITHSONIAN INST, DIST OF COLUMBIA

JURASSIC FORAMINIFERA FROM THE WESTERN INTERIOR OF THE UNITED STATES

R. CIFELLI

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SMITHSONIAN INSTITUTION

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ZUA 11 3 FIELD 13B,12A, 8E

USDI, GEOL SURV, DIST OF COLUMBIA

DIRECT GEODETIC CONSTRAINT METHOD OF ANALYTICAL AEROTRAINGULATION

R. C. ELLER

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INTERIOR-GEOLOGICAL SURVEY

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ZUA 696 3 FIELD 8D, 8H, 8G

USDI, GEOL SURV ARLGTN, VIRGINIA

SPATIAL DISTRIBUTION OF CHEMICAL CONSTITUENTS IN GROUND WATER

H. BACK

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INTERIOR-GEOLOGICAL SURVEY

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ZUA 735 2 FIELD 8F, 8E,12A

MATHEMATICAL GEOMORPHOLOGY

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INTERIOR-GEOLOGICAL SURVEY

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ZUA 751 2 FIELD 8D, 8H

PERMIAN BASIN - ORIGIN OF SALINE WATER DISCHARGE

R. R. STEVENS

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INTERIOR-GEOLOGICAL SURVEY

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ZUA 757 2 FIELD 13G, 8H

USDI, GEOL SURV, DIST OF COLUMBIA

DETERMINATION OF MANNING COEFFICIENT FROM MEASURED BED ROUGHNESS

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INTERIOR-GEOLOGICAL SURVEY

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ZUA 766 1 FIELD 13G, 8H, 8G

FLOW AND SEDIMENT TRANSPORT, RIO GRANDE CONVEYANCE CHANNEL

J. K. CULBERTSON

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INTERIOR-GEOLOGICAL SURVEY

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ZUA 783 1 FIELD 8F, 8H

SOURCES, MOVEMENT, AND DISTRIBUTION OF SEDIMENT IN A SMALL WATER SHED

M. G. WOLMAN

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INTERIOR-GEOLOGICAL SURVEY

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ZUA 785 1 FIELD 8F, 8H, 8G

GEOLOGIC HISTORY OF THE COLORADO RIVER

C. B. HUNT

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INTERIOR-GEOLOGICAL SURVEY

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ZUA 805 1 FIELD 13G, 8H

CROSS CHANNEL DIFFUSION

R. R. WRIGHT

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INTERIOR-GEOLOGICAL SURVEY

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ZUA 816 FIELD 13B, 8F, 8H, 8G

GEOLOGIC STRUCTURE AND FRESH GROUND WATER IN GULF COASTAL PLAIN

P. H. JONES

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INTERIOR-GEOLOGICAL SURVEY

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ZUG 804 FIELD 8D

USDI, BUR MINES, SPOKANE, WASHINGTON

IMPROVED COAL MINE SUPPORT SYSTEMS FOR STEEPLY DIPPING VEINS

W. S. ANDERSON

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INTERIOR-BUREAU OF MINES

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ZUG 806 FIELD 8K, 8G, 8D

USDI, BUR MINES, DENVER, COLORADO

LABORATORY GEOPHYSICAL STUDIES

R. M. BECKER

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INTERIOR-BUREAU OF MINES

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ZUG 807 FIELD 8K, 8G, 8D

USDI, BUR MINES, DENVER, COLORADO

PROPERTIES AND USE OF MICROSEISMS

R. M. BECKER

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INTERIOR-BUREAU OF MINES

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ZUG 816 FIELD 7C, 7D, 8D, 7B

USDI, BUR MINES, PITTSBURGH, PENNSYLVANIA

DEVELOPMENT OF CHROMATOGRAPHIC TECHNIQUES FOR MINE AIR ANALYSIS

R. W. FREEDMAN

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INTERIOR-BUREAU OF MINES

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ZUG 818 FIELD 7C, 7D,21D, 8D

JSDI, BUR MINES, PITTSBURGH, PENNSYLVANIA

CONTAMINANT GASES IN COAL MINES

R. W. FREEDMAN, H. W. LANG

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INTERIOR-BUREAU OF MINES

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ZUG 825 FIELD 8G, 8D

USDI, BUR MINES, DENVER, COLORADO

IN SITU DETERMINATION OF INELASTIC ROCK PROPERTIES

R. L. LAPPI

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INTERIOR-BUREAU OF MINES

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ZUG 829 FIELD 8D,20K

USDI, BUR MINES, PITTSBURGH, PENNSYLVANIA

SPECIFICATIONS FOR ROOF BOLT BEARING PLATES

J. A. MCCORMICK, J. H. STEARS

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INTERIOR-BUREAU OF MINES

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ZUG 832 FIELD 8G, 8D

EFFECT OF STRESS ON MICROSTRUCTURE

J. H. MCWILLIAMS, R. E. THILL
R. J. WILLARD

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INTERIOR-BUREAU OF MINES

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ZUG 837 FIELD 8G, 8D

USDI, BUR MINES, DENVER, COLORADO

RESIDUAL STRESS IN ROCK

L. OBERT

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INTERIOR-BUREAU OF MINES

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ZUG 851 FIELD 8G, 8D

USDI, BUR MINES, PITTSBURGH, PENNSYLVANIA

COAL BURSTS AND COAL MINE BUMPS

A. ZONA

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INTERIOR-BUREAU OF MINES

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ZUG 870 FIELD 8D

USDI, BUR MINES, SAN FRANCISCO, CALIFORNIA

PRESSURE SATURATION CHARACTERISTICS OF FLOODED GAS SANDS

D. C. CROWELL, G. W. DEAN

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INTERIOR-BUREAU OF MINES

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ZUG 877 FIELD 8D, 8G

USDI, BUR MINES, BARTLESVILLE, OKLAHOMA

THERMAL TREATMENT FOR GAS STORAGE WELL DELIVERABILITY IMPROVEMENT

H. E. ECKARD, L. J. HEATH, R. V. HUFF

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INTERIOR-BUREAU OF MINES

09 ELECTRONICS AND ELECTRICAL ENGINEERING

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GSE 794 1 FIELD 9+,12A,13M

UNIV OF CAL-L. A., SCHOOL OF ENGINEERING, ENGINEERING, CALIFORNIA

HYBRID COMPUTATION

W. J. KARPLUS, J. J. VIDAL

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GSE 883 FIELD 9+

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SOLID STATE DISTRIBUTED ACTIVE DEVICES

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GSP 221d FIELD 3B, 9+, 9A

CARNEGIE INST OF WAS, DIST OF COLUMBIA

DEVELOPMENT, PRODUCTION AND DEMONSTRATION OF IMAGE TUBES

M. A. TUVE

NSF-GP-1559-A1
4/64- 4/65

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ZQN 530621 1 FIELD 15+, 9+,15G

NAVAL AIR DEVELOPMENT, PENNSYLVANIA

MICROELECTRONIC APPLICATIONS

J. WILLIS

/65- /

DOD-NAVY

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ZQN 544125 FIELD 9+, 9C, 9A

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

POWER LINE TRANSIENT ANALYSIS

H. H. KASIHARA, E. H. WOLFF

/65- /

DOD-NAVY

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ZQN 544130 FIELD 9+, 9A,20L,20K

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

ANTENNA WIRE SUPPORT BOOM STUDIES

R. H. CHIU

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ZQN 544209 FIELD 9+, 9C, 9A

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

POWER LINE TRANSIENT SUPPRESSION

S. J. WOOTEN

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ZQN 544218 3 FIELD 20M, 9+, 9A,20L

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

SOLID STATE PHYSICS ELECTRONIC DEVICES

D. B. CLARK, R. D. HITCHCOCK

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DOD-NAVY

10 ENERGY CONVERSION (NON-PROPULSIVE)

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ZQN 531339 FIELD 7D, 7A, 9C, 9+

USN, BUR NAV WEAP, WHITE OAK, MARYLAND

FUEL CELL POWER GENERATION TECHNOLOGY

B. E. DRIMMER

/65- /

DOD-NAVY

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ZQN 544124 FIELD 15+, 9+, 9C

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

POWER SYSTEMS-UNINTERRUPTIBLE

E. GIORGI, E. H. WOLFF

/65-

DOD-NAVY

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ZQN 544158 FIELD 15+, 9+, 9C

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

UNINTERRUPTIBLE POWER EQUIPMENT

E. GIORGI, E. H. WOLFF

/65- /

DOD-NAVY

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ZQN 544202 FIELD 9C, 9+

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

POWER EQUIPMENT REPLACEMENT STUDY

R. D. SPENCER, C. E. PARKER

/65-

DOD-NAVY

11 MATERIALS

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GSE 699 FIELD 11G,12A,13M,20L

GEORGE WASHINGTON UNIV, SCHOOL OF ENGINEERING, ENGINEERING, DIST OF COLUMBIA

STRAIN HARDENING OF THIN PLATES SUBJECTED TO DYNAMIC LOADS

T. G. TORIDIS

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GSE 732 FIELD 7C, 7D,11B,11G

COLORADO SCH OF MINES, SCHOOL OF ENGINEERING, METALLURGICAL ENGIN, COLORADO

FLOTATION PROCESSES - ADSORPTION OF COLLOIDAL PRECIPITATES

M. C. FUERSTENAU

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GSE 758 FIELD 11F,11G

NEW YORK UNIVERSITY, SCHOOL OF ENGINEERING, METAL ENGIN + MAT SCI, NEW YORK

CELL SIZE DISTRIBUTION AND GROWTH LAWS OF METALS

J. P. NIELSON

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GSE 768 FIELD 11F,11G

DISORDERING OF BINARY ALLOYS

A. BIENENSTOCK

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GSE 778 FIELD 7D,11G

PENNSYLVANIA ST UNIV, SCHOOL OF MINERAL IND, METALLURGY, PENNSYLVANIA

VANISHING BOUNDARY CURVES IN TERNARY SYSTEMS

A. MUAN

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GSE 814 FIELD 20M,11G

UNIV OF CAL-BERKELEY, SCHOOL OF ENGINEERING, INST ENGINEERING RES, CALIFORNIA

MELTING AND ORDER-DISORDER OF ALLOYS

S. F. RAVITZ

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GSE 829 FIELD 7D,11F,11G, 7B

VIRGINIA POLYTECH INST, SCHOOL OF ENGINEERING, METALS + CERAMIC ENGIN, VIRGINIA

SOLUBILITY OF SULFUR IN IRON ALLOYS

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GSE 851 FIELD 11B,11G

DEVELOPMENT OF AN AIR VOID SYSTEM IN CONCRETE USING SURFACE-ACTIVE AGENTS

K. R. LAUER

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GSE 875 FIELD 11F,11G

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STACKING FAULT ENERGY OF THE ZETA-PHASE IN THE SYSTEM SILVER-ALUMINUM

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GSE 876 FIELD 11F,11G

GEORGIA INST OF TECH, SCHOOL OF ENGINEERING, MECHANICAL ENGINEERING, GEORGIA

DEFORMATION OF METALS AND ALLOYS AT ELEVATED TEMPERATURES

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GSP 966 3 FIELD 20M,11F,20C, 5A

PURDUE UNIVERSITY, GRADUATE SCHOOL, PHYSICS, INDIANA

TRANSPORT PROPERTIES OF DILUTE ALLOYS

A. N. GERRITSEN

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GSP 2413 FIELD 5A,11F

UNIV OF PENNSYLVANIA, SCHOOL OF ENGINEERING, METALLURGICAL ENGIN, PENNSYLVANIA

METALLURGY OF ARCHEOLOGICAL SPECIMENS

R. MADDIN

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7/65- 7/66

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GUE 2 2 FIELD 11F,11G, 7B

MASS INST OF TECHNOL, SCHOOL OF ENGINEERING, METALLURGY, MASSACHUSETTS

EFFECT OF ELECTROCHEMICAL AND METALLURGICAL FACTORS ON CORROSION OF METALS AND ALLOYS

H. H. UHLIG

SW-0
4/66- 4/66

INTERIOR-OFFICE OF SALINE WATER

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GUE 4 2 FIELD 7A, 7D

STANFORD UNIVERSITY, SCHOOL OF ENGINEERING, CHEMICAL ENGINEERING, CALIFORNIA

HYDRODYNAMIC EFFECTS OF SURFACE ACTIVE AGENTS

A. ACRIVOS

SW-14-01-0001-386
4/66- 6/66

INTERIOR-OFFICE OF SALINE WATER

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JIM 1 FIELD 11F,13H,11G

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, MECHANICAL + IND ENGIN, ILLINOIS

INFLUENCE OF ELECTRO DISCHARGE MACHINING ON SURFACE DAMAGE OF HARDENED STEEL

K. J. TRIGGER, R. ADELMAN, M. R. LEBEGUE

/65- /

INGERSOL MILLING MACHINE COMPANY

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JIZ 2 FIELD 11B,11C,11F,11G

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, CERAMIC ENGINEERING, ILLINOIS

INTERFACIAL REACTIONS IN LEAD OXIDE BEARING ENAMEL-IRON SYSTEMS

R. L. COOK, C. B. GREENBERG

/65- /

INTERNATIONAL LEAD ZINC RES ORGANIZATION

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JUS 1 FIELD 11B, 5A,11D,11F

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, THEORETICAL + AP MECH, ILLINOIS

BEHAVIOR OF DEFORMED WIRE FABRIC IN CONCRETE

C. E. KESLER, R. S. JENSEN, H. G. KOHLER L. M. SUR

/65- /

UNITED STATES STEEL CORPORATION

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PHR 3 FIELD 13F,11B,11G,20K

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, THEORETICAL + AP MECH, ILLINOIS

STUDY OF PHYSICAL FACTORS INFLUENCING RESISTANCE OF CONCRETE TO DEICING AGENTS
C. E. KESLER, G. BEALL, J. P. CALLAHAN D. FISCHER, T. W. KENNEDY, C. E. KESLER J. L. LOTT

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ZQA 2 FIELD 5A,11F,11G, 7B

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

STUDY OF PHYSICAL CHEMISTRY OF GASES IN HIGH STRENGTH ALUMINUM ALLOY CASTINGS

P. GOETTSCH

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

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ZQA 3 FIELD 7C, 7D,20M,11G

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

SYNTHESIS OF ELASTIC POLYAMINOQUINONES

R. FREEMAN

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

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ZQA 11 FIELD 7C, 7D,11G,11H

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

IDENTIFICATION OF GREASE OXIDATION PRODUCTS

G. MURPHY

/65- /

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ZQA 13 FIELD 11G,11H,20D,15G

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

DEVELOPMENT OF FLUIDS WITH IMPROVED CORROSION RESISTANCE WATER STABILITY AND LUBRICITY

R. JOHNSON

/65- /

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ZQA 14 FIELD 20M,11G,11H,10B

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

THERMAL STABILITY OF CHEM COMPOSITIONS FOR MULTI-PURPOSE POWER TRANSMISSION FLUID

R. LEMAR

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

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ZQA 16 FIELD 7C, 7D,20M,11H

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

DIFFUSION OF GASES THROUGH OIL FILMS
H. MUFFLEY

/65- /

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ZQA 29 FIELD 5A,11F,11G

USA, ORD CORPS, WATERVLIET ARSNL, NEW YORK

EXTREME PRESSURE EFFECTS ON PROPERTIES OA METALS AND ALLOYS

T. DAVIDSON

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

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ZQA 31 FIELD 11B,11C,11F,11G

USA, ORD CORPS, WATERVLIET ARSNL, NEW YORK

ELECT4ODEPOSITION OF DISPERSION-HARDENED ALLOYS

F. SAUTTER

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

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ZQA 34 FIELD 11F,13H,11G

USA, ORD CORPS, WATERVLIET ARSNL, NEW YORK

SURFACE PROPERTIES AND BEHAVIOR OF MATERIALS

A. LIND

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

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ZQA 40 FIELD 20M,11G,11D,12A

USA, ORD CORPS, WATERVLIET ARSNL, NEW YORK

FIBERGLASS TUBE MORTAR STUDY

D. L. SPRING, C. I. GUTIERREZ

/65- /

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ZQA 138 FIELD 11F,11G

USA, ORD CORPS, WATERVLIET ARSNL, NEW YORK

STRAIN RATE EFFECTS UPON YIELDING CHARACTERISTICS OF METALS

D. KENDALL

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

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ZQA 154 FIELD 11B

USA, ORD CORPS, WATERTOWN ARSNL, MASSACHUSETTS

STUDY OF VAPOR DEPOSITION AS A MEANS OF TAILORINGPROPERTIES OF CERAMICS

P. WONG

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

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ZQA 159 FIELD 11B,11G,11D,15G

USA, ORD CORPS, SPRINGFIELD ARM, MASSACHUSETTS

FIBER REINFORCED COMPOSITES

J. KWOLEK, J. SZANTO, A. ZAVARELLA

/65- /

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ZQA 167 FIELD 20M,11B,11D,11F

USA, ORD CORPS, WATERVLIET ARSNL, NEW YORK

HIGH TEMPERATURE STABILITY - DISPERSION HARDENED ALLOYS

F. SAUTTER

/65- /

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ZQA 169 FIELD 11F,11G

USA, ORD CORPS, WATERVLIET ARSNL, NEW YORK

STRESS STATE DEPENDENCY OF FRACTURE MECHANISMS IN METALS

J. UY

/65- /

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ZQA 170 FIELD 11F,11G

USA, ORD CORPS, WATERVLIET ARSNL, NEW YORK

STRESS AND STRAIN FIELDS IN THE REGION OF CRACKS IN METALS

D. KENDALL

/65- /

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ZQA 171 FIELD 11G,11D,11F

USA, ORD CORPS, WATERVLIET ARSNL, NEW YORK

PHOTOELASTIC STUDY-STRESS DISTRIBUTIONS IN FIBER-REINFORCED COMPOSITES

T. MACLAUGHLIN

/65- /

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ZQA 172 FIELD 11G,11D,12A

USA, ORD CORPS, WATERVLIET ARSNL, NEW YORK

THREE DIMENSIONAL FORCE TRANSFER BETWEEN MICROFIBERS

M. SADOWSKY

/65- /

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ZQA 173 FIELD 11F,11G,20L,20K

USA, ORD CORPS, WATERVLIET ARSNL, NEW YORK

PRESSURE-TEMPERATURE PHASE EQUILIBRIA IN PURE METALS

T. DAVIDSON

/65- /

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ZQA 178 FIELD 11F,13H,11G

USA, ORD CORPS, WATERVLIET ARSNL, NEW YORK

THE BAUSCHINGER EFFECT IN METALS

R. V. MILLIGAN, W. H. KOO

/65- /

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ZQA 179 FIELD 11F,13H,11G

USA, ORD CORPS, WATERVLIET ARSNL, NEW YORK

STRESS AGING

R. HARRINGTON

/65- /

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ZQA 188 FIELD 20M,11G,11D

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

DEVELOPMENT OF RUBBER COMPOSITIONS FOR HIGH TEMPERATURE USE

W. VERDEVEN

/65- /

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ZQA 194 FIELD 11A,11F,11G

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

DEVELOPMENT OF A REMOVABLE FILM CORROSION PREVENTIVE FOR METAL SURFACES

W. GARLAND

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

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ZQA 201 FIELD 11C,11F

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

PLATED AND CONVERSION COATINGS

W. CRAWFORD

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

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ZQA 205 FIELD 11F,13H,11G

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

FRACTURE TOUGHNESS OF CASE HARDENED STEELS

L. PITTMAN

/65- /

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ZQA 206 FIELD 11F,13H,11G

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

RELATION OF CAST METAL PROPERTIES TO TEST BAR DESIGN

W. WURTZ

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

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ZQA 209 FIELD 7C, 7D,20M,11G

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

SEMI INORGANIC HEAT RESISTANT ELASTOMERS BASED ONBORON

L. WIEDENMANN

/65- /

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ZQA 210 FIELD 11H

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

PERMEABILITY OF GREASES AS A BASIS FOR DETERMINING THICKENER STRUCTURE

S. F. CALHOUN

/65- /

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ZQA 222 FIELD 11H

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

DEVELOPMENT OF HIGH TEMPERATURE HYDRAULIC FIELD

R. LEMAR

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ZQA 231 FIELD 11G

USA, ORD CORPS, ROCK ISL ARSNL-ILLINOIS

EVALUATION OF NEW PACKAGING MATERIALS AND METHODS

G. MARTIN

/65- /

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ZQA 234 FIELD 11B,11C,11D

USA, ORD CORPS, WATERTOWN ARSNL, MASSACHUSETTS

INVESTIGATION OF STRENGTHENING MECHANISMS IN CERAMICS

A. TARPINIAN

/65- /

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ZQF 284683 5 FIELD 11B,11G,12A,20H

USAF, AFSC, RTD, WRIGHT-PATT-AF MAT LAB, OHIO

FUNDAMENTAL PHYSICAL BEHAVIOR OF ELASTOMERS

F. S. OWENS

/65- /

DOD-AIR FORCE

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ZQF 284684 2 FIELD 20M,11G

USAF, AFSC, RTD, WRIGHT-PATT-AF MAT LAB, OHIO

INVESTIGATIONS OF STRUCTURE-PROPERTY RELATIONSHIPS OF POLYMERIC MATERIALS

P. M. WILLIAMSON

/65- /

DOD-AIR FORCE

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ZQF 284685 4 FIELD 7C, 7A, 7D,20M

USAF, AFSC, RTD, WRIGHT-PATT-AF MAT LAB, OHIO

RESEARCH ON POLYMER DEGRADATION MECHANISMS

I. J. GOLDFARB

/65- /

DOD-AIR FORCE

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ZQF 284687 3 FIELD 11B,11H

USAF, AFSC, RTD, WRIGHT-PATT-AF MAT LAB, OHIO

FUNDAMENTAL FRICTION AND WEAR INVESTIGATIONS

T. LIU

/65- /

DOD-AIR FORCE

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ZQF 284894 FIELD 11G,11D,11F,13H

JSAF, AFSC, RTD, WRIGHT-PATT-AF MAT LAB, OHIO

COMPOSITE FUNDAMENTALS

J. A. HERZOG

/65- /

DOD-AIR FORCE

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ZQF 284895 FIELD 20M,11F,13H,11G

USAF, AFSC, RTD, WRIGHT-PATT-AF MAT LAB, OHIO

EUTECTOID DECOMPOSITION OF TITANIUM BINARY ALLOYS

M. L. GEGEL

/65- /

DOD-AIR FORCE

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ZQF 284896 FIELD 11F,13H,11G

USAF, AFSC, RTD, WRIGHT-PATT-AF MAT LAB, OHIO

DEFROMATION AND AGING OF BODY-CENTERED CUBIC METALS

C. S. HARTLEY

/65- /

DOD-AIR FORCE

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ZQF 475248 1 FIELD 3A,11F,11G, 7B

USAF, OAR, ARL, WRIGHT-PATT-CHEM RES, OHIO

MATERIAL PARAMETERS AFFECTING METEOROID PENETRATION IN BERYLLIUM

R. L. MCGUIRE

/65- /

DOD-AIR FORCE

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ZQN 544133 1 FIELD 11B,11C

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

COATINGS FOR FLOATING DRYDOCK WORK AREA

C. V. BROUILLETTE, W. S. HAYNES

/65- /

DOD-NAVY

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ZQN 544139 FIELD 5A,11D,11G

JSN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

STRUCTURAL PLASTICS

R. A. BRECKENRIDGE

/65- /

DOD-NAVY

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ZQN 544140 1 FIELD 5A,11F

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

BIOLOGICAL CORROSION OF METALS

H. P. VIND, W. S. HAYNES

/65-

DOD-NAVY

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ZQN 544156 5 FIELD 11G, 5A

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

CORROSION RESISTANCE PIPE AND TUBING

T. ROE

/65- /

DOD-NAVY

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ZQN 544164 5 FIELD 11C,11F

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

COATINGS FOR WATER STORAGE TANKS

R. W. DRISKO, W. S. HAYNES

/65- /

DOD-NAVY

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ZQN 544166 4 FIELD 7D,11C,13H

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

SPECTROGRAPHIC ANALYSIS OF PAINTS

J. B. CRILLY

/65- /

DOD-NAVY

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ZQN 544195 FIELD 13F,11B

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

MICRO-PROPERTIES OF ASPHALT

J. A. BISHOP, S. BUYG

/65- /

DOD-NAVY

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ZQN 544201 1 FIELD 11F,20D,10B

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

INVESTIGATION OF FILM EVAPORATION ON THE OUTSIDE OF HORIZONTAL TUBES

J. S. WILLIAMS, E. H. WOLFF

/65- /

DOD-NAVY

12 MATHEMATICAL SCIENCES

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GSE 790 1 FIELD 9+,12A, 9C

UNIVERSITY OF MICHIGAN, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, MICHIGAN

MARKOV DECISION PROCESSES IN THE CONTROL OF QUEUES

K. CHUANG

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3/66- 3/67

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GSM 321 2 FIELD 12A

MASS INST OF TECHNOL, GRADUATE SCHOOL, MATHEMATICS, MASSACHUSETTS

ALGEBRAIC TOPOLOGY AND GEOMETRY

G. W. WHITEHEAD, D. ANDERSON, M. ARTIN E. B. CURTIS, D. M. KAN, B. KOSTANT J. R. MUNKRES

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3/66- 3/67

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GSM 348 1 FIELD 12A

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PROBABILITY AND STATISTICS

L. LECAM, D. BLACKWELL, R. COGBURN L. E. DUBINS, E. FIX, D. A. FREEDMAN M. LOEVE

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3/65- 9/65

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GSM 382 2 FIELD 12A, 5C

MASS INST OF TECHNOL, GRADUATE SCHOOL, MATHEMATICS, MASSACHUSETTS

GEOMETRY AND NUMBER THEORY

W. AMBROSE, N. C. ANKENY, A. P. MATTUCK D. G. QUILLEN, I. M. SINGER

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3/66- 3/67

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GSM 383 1 FIELD 12A,20J

MASS INST OF TECHNOL, GRADUATE SCHOOL, MATHEMATICS, MASSACHUSETTS

PROBLEMS IN ANALYSIS

N. LEVINSON, J. G. GLIMM, S. HELGASON F. B. HILDEBRAND, K. M. HOFFMAN H. P. MCKEAN, D. B. RAY

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GSM 384 2 FIELD 12A

MASS INST OF TECHNOL, GRADUATE SCHOOL, MATHEMATICS, MASSACHUSETTS

ALGEBRAIC NUMBERS, NONASSOCIATIVE ALGEBRAS AND RECURSIVE FUNCTIONS

K. IWASAWA

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3/66- 3/67

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GSM 531 1 FIELD 12A

UNIVERSITY OF COLORADO, GRADUATE SCHOOL, MATHEMATICS, COLORADO

SPECTRAL THEORY OF LINEAR OPERATORS AND ITS APPLICATIONS

R. MCKELVEY

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GSP 2267 FIELD 12A,20H,20J

MASS INST OF TECHNOL, GRADUATE SCHOOL, MATHEMATICS, MASSACHUSETTS

APPLIED MATHEMATICS AND MATHEMATICAL PHYSICS

C. LIN

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GSP 2283 1 FIELD 12A

BROWN UNIVERSITY, GRADUATE SCHOOL, APPLIED MATHEMATICS, RHODE ISLAND

DEVELOPMENT AND ANALYSIS OF NUMERICAL PROCEDURES

P. J. DAVIS, W. F. FREIBERGER

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GSP 2284 1 FIELD 12A

UNIVERSITY OF MICHIGAN, GRADUATE SCHOOL, MATHEMATICS, MICHIGAN

COMPLEX VARIABLES AND FUNCTIONAL ANALYSIS

M. O. READE, J. M. ANDERSON, D. DICKSON P. L. DUREN, F. W. GEHRING, J. KRZYZ A. L. SHIELDS

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GSP 2285 1 FIELD 12A

UNIV OF CAL-RIVERSIDE, GRADUATE SCHOOL, MATHEMATICS, CALIFORNIA

THE GENERAL CLASSIFICATION PROBLEM FOR CONTINUA

B. F. JONES

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GSP 2286 1 FIELD 12A

UNIV OF CAL-RIVERSIDE, GRADUATE SCHOOL, MATHEMATICS, CALIFORNIA

NONLINEAR PARTIAL DIFFERENTIAL EQUATIONS OF MIXED TYPE

J. HAJIMU

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GSP 2289 1 FIELD 12A

UNIVERSITY OF MICHIGAN, GRADUATE SCHOOL, MATHEMATICS, MICHIGAN

TOPOLOGY AND DIFFERENTIAL GEOMETRY

E. HALPERN, M. BROWN, N. J. HICKS J. M. KISTER, R. C. ONEILL, R. H. ROSEN

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GSP 2292 1 FIELD 12A

UNIVERSITY OF MICHIGAN, GRADUATE SCHOOL, MATHEMATICS, MICHIGAN

ALGEBRA AND LOGIC

R. C. LYNDON, J. H. BENNETT, J. A. COHN
D. G. HIGMAN, E. F. KRAUSE, D. LIVINGSTON
J. L. MCLAUGHLIN

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GSP 2365 FIELD 12A

YESHIVA UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

A UNIFORM JACKSON THEOREM FOR ARBITRARY SETS

D. J. NEWMAN

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GSP 2373 FIELD 12A

UNIV OF VT + ST AGRIC, GRADUATE SCHOOL, MATHEMATICS, VERMONT

LINEAR AND QUASI-LINEAR DIFFERENTIAL OPERATORS WITH BLOCKS OF REPEATED APPROXIMATE FACTORS

E. W. CHAMBERLAIN

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GSP 2378 FIELD 12A

COMMUTING HOLOMORPHIC FUNCTIONS

W. A. PRANGER

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GSP 2389 1 FIELD 5A,20A

UNIV OF VT + ST AGRIC, GRADUATE SCHOOL, PHYSICS, VERMONT

MICROBUBBLE DYNAMICS IN ULTRASONIC WAVES

T. D. SACHS

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GSP 2404 FIELD 12A,20H,20J

UNIV OF WASHINGTON, GRADUATE SCHOOL, MATHEMATICS, WASHINGTON

APPLIED PARTIAL DIFFERENTIAL OPERATORS AND MATHEMATICAL QUANTUM MECHANICS

F. H. BROWNELL

NSF-GP-4501
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

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GSP 2407 FIELD 12A

SYRACUSE UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

REPRESENTATIONS OF CONTINUOUS FUNCTIONS OF SEVERAL VARIABLES

D. A. SPRECHER

NSF-GP-4165
4/65- 4/66

NSF-PHYSICAL SCIENCES DIVISION

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YKA 172 FIELD 12A

IRREGULAR FRACTIONAL REPLICATION PLANS

K. S. RANENJEE

KANS-5-829
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STATE-KANSAS

13 MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING

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7GX 594 4 FIELD 13B

UNIVERSITY OF MICHIGAN, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, MICHIGAN

SAND FILTRATION OF DISCRETE SUSPENSIONS

J. A. BORCHARDT

7-WP-00329-04
12/65-11/66

PHS-BSS

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7GX 1247 2 FIELD 13B

ILLINOIS INST OF TECH, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, ILLINOIS

FOAM SEPARATION - FLOTATION OF COLLOID-ORGANIC SYSTEMS

R. B. GRIEVES, C. F. GURNHAM

ESE (7WP-00702-02)
1/66-12/66

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7GX 1590 2 FIELD 13B, 7D, 7B

MANHATTAN COLLEGE, SCHOOL OF ENGINEERING, CHEMICAL ENGINEERING, NEW YORK

PREVENTION OF CHROMATE POLLUTION BY ELECTRODIALYSIS

J. B. FARRELL, M. K. MURPHY

7-WP-00742-02
10/65- 9/66

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7ZX 210 3 FIELD 13A,10B

USDHEW BSS ENGIN CTR, SANI ENG CTR,CINCINNAT, OHIO

ENGINE MODIFICATION STUDIES

R. C. STAHMAN, D. M. HOLLABAUGH
M. W. KORTH, R. E. KRUSE, W. F. MCMICHAEL

BSS-B-1-7
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7ZX 213 3 FIELD 13A, 7C, 7D,10B

USDHEW BSS ENGIN CTR, SANI ENG CTR,CINCINNAT, OHIO

AUTO EXHAUST STUDIES

J. E. SIGSBY, T. A. BELLAR

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7ZX 214 3 FIELD 13A, 7C, 7D, 7A

USDHEW BSS ENGIN CTR, SANI ENG CTR,CINCINNAT, OHIO

IRRADIATION CHAMBER STUDIES

J. E. SIGSBY, P. W. LEACH

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7ZX 215 3 FIELD 13A, 7C, 7D

USDHEW BSS ENGIN CTR, SANI ENG CTR,CINCINNAT, OHIO

SEPARATION TECHNIQUES ON GASES AND VAPORS

B. E. SALTZMAN, A. P. ALTSHULLER
C. A. CLEMONS

BSS-B-2-6
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7ZX 216 3 FIELD 13A, 7D, 7A, 7B

USDHEW BSS ENGIN CTR, SANI ENG CTR,CINCINNAT, OHIO

ANALYTICAL METHODOLOGY ON GASES AND VAPORS

B. E. SALTZMAN, A. F. WARTBURG

BSS-B-2-5
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7ZX 221 3 FIELD 13B, 7C, 7D, 7A

USDHEW BSS ENGIN CTR, SANI ENG CTR,CINCINNAT, OHIO

PHYSICAL AND CHEMICAL PROPERTIES OF BIOLOGICALLY-ACTIVE AEROSOLS

H. J. STEVENSON, E. CORDIER, J. P. FLESCH
J. F. ROESLER, D. E. SANDERSON
G. VANDERZANDEN

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7ZX 224 3 FIELD 13A,13B, 7B

USDHEW BSS ENGIN CTR, SANI ENG CTR,CINCINNAT, OHIO

CONTINOUS AIR MONITORING PROJECT

G. A. JUTZE, L. DUNN, D. M. FAIR
P. KOLOS, R. J. LEWIS

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PHS-BSS

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7ZX 226 3 FIELD 4B

USDHEW BSS ENGIN CTR, SANI ENG CTR,CINCINNAT, OHIO

NATIONAL AIR SAMPLING NETWORK

E. C. TABOR, N. A. HUEY, C. D. ROBSON

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7ZX 227 3 FIELD 13A, 7C, 7D, 4B

USDHEW BSS ENGIN CTR, SANI ENG CTR,CINCINNAT, OHIO

INTERRELATIONSHIPS OF METEOROLOGICAL ELEMENTS AND AIR QUALITY

J. F. CLARKE

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7ZX 228 3 FIELD 4B

USDHEW BSS ENGIN CTR, SANI ENG CTR,CINCINNAT, OHIO

THE CLIMATOLOGY OF METEOROLOGICAL FACTORS AFFECTING THE TRANSPORT AND DISPERSION OF ATMOSPHERIC POLLUTANTS

G. HOLZWORTH

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7ZX 229 3 FIELD 13A,13B, 4B

USDHEW BSS ENGIN CTR, SANI ENG CTR,CINCINNAT, OHIO

FORECASTING AIR POLLUTION POTENTIAL

L. E. NIEMEYER, J. F. CLARKE
A. S. KUSSMAN

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7ZX 231 3 FIELD 13A,13B, 4B

USDC, WEATH BUR, DIST OF COLUMBIA

INTRA-AND INTER-URBAN TRANSPORT AND DIFFUSION OF AIR POLLUTION

D. H. PACK, F. POOLER

BSS-B-5-2
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PHS-BSS

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7ZX 244 3 FIELD 13A,13B, 4B, 6B

USDHEW BSS ENGIN CTR, SANI ENG CTR,CINCINNAT, OHIO

EVALUATION OF SAMPLING METHODS

F. B. BENSON

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7ZX 246 3 FIELD 13A,13B, 8D, 7B

USDHEW BSS ENGIN CTR, SANI ENG CTR,CINCINNAT, OHIO

DEVELOPMENT OF ANALYTICAL PROCEDURES FOR AIR CONTAMINANTS

T. R. HAUSER

BSS-C-7-2
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PHS-BSS

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7ZX 254 3 FIELD 13B, 4B,12A

USDHEW BSS ENGIN CTR, SANI ENG CTR,CINCINNAT, OHIO

SEWARD-NEW FLORENCE AIR POLLUTION STUDY

R. J. HORTON, J. *. HORTON, F. MASSEY

BSS-C-1-7
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PHS-BSS

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7ZX 266 3 FIELD 13A, 8D, 4B,11F

USDHEW BSS ENGIN CTR, SANI ENG CTR,CINCINNAT, OHIO

INTERSTATE AIR POLLUTION STUDY - ST. LOUIS-EAST ST. LOUIS METROPOLITAN AREA

J. D. WILLIAMS, H. N. JENKINS
D. S. MATHEWS, F. PARTEE, L. RING
J. W. SADLER, J. P. SPERBER

BSS-D-2-54
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PHS-BSS

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7ZX 276 3 FIELD 13A,10B

USDHEW BSS ENGIN CTR, SANI ENG CTR,CINCINNAT, OHIO

REMOVAL OF SO2 FROM COMBUSTION EFFLUENTS

P. W. SPAITE, W. F. TODD

BSS-B-1-5
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PHS-BSS

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GR 67

WASHINGTON UNIVERSITY, GRADUATE SCHOOL, ARCHITECTURE, MISSOURI

REPORT ON URBAN RENEWAL DESIGN COORDINATION

G. E. PAKE, R. MONTGOMERY
J. R. PASSONNEAU

/66- /

HOUSING AND HOME FINANCE AGENCY

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GSE 718 FIELD 13F,11B,11G,11D

LEHIGH UNIVERSITY, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, PENNSYLVANIA

A STRUCTURAL MODEL STUDY OF LOAD DISTRIBUTION IN BRIDGES

D. A. VANHORN

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10/65- 9/66

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GSE 786 FIELD 13B

UNIV OF WASHINGTON, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, WASHINGTON

SYSTEMS ANALYSIS OF WATER AND WASTE TREATMENT PROCESSES

R. H. BOGAN, M. N. CLARK

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3/65- 3/66

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GSE 801 1 FIELD 10B

OKLAHOMA STATE UNIV, SCHOOL OF ENGINEERING, MECHANICAL ENGINEERING, OKLAHOMA

MOBILITY CRITERIA OF A SIX-BAR SPACE MECHANISM

L. HARRISBERGER

NSF-GK-172
3/66- 3/67

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GSE 832

NATL ACAD SCI NAT RE, DIST OF COLUMBIA

STUDY AND SYMPOSIUM ON PERFORMANCE CHARACTERISTICS FOR BUILDING COMPONENTS

R. M. DILLON

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5/65- 5/66

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GSE 848 FIELD 12A, 5C

MASS INST OF TECHNOL, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, MASSACHUSETTS

SYSTEMS ANALYSIS IN BUILDING DESIGN

A. G. DIETZ

NSF-GK-365
6/65- 6/66

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GSE 852 FIELD 13H,11G

UNIVERSITY OF MICHIGAN, SCHOOL OF ENGINEERING, MECHANICAL ENGINEERING, MICHIGAN

INFLUENCE OF PHYSICAL PROPERTIES ON MACHINABILITY

J. OATSKO

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4/65- 4/66

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GSE 855 FIELD 5A

COLORADO STATE UNIV, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, COLORADO

STUDY OF RESEARCH NEEDS IN CIVIL ENGINEERING

M. L. ALBERTSON

NSF-GK-467
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GSE 901 FIELD 20L,20D,10B

FACTORS INFLUENCING THE PERFORMANCE OF GEAR DRIVES

E. I. RADZIMOVSKY

NSF-GK-707
11/65-11/66

NSF-ENGINEERING SCIENCES DIVISION

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GUW 351 FIELD 13G

VIRGINIA POLYTECH INST, GRADUATE SCHOOL, WATER RESOURCES, VIRGINIA

FLOOD DAMAGE ABATEMENT STUDY FOR VIRGINIA

W. R. WALKER, J. P. BARFIELD
W. *. WALKER

INT-WR-A-006-VA
/66- /

INTERIOR-OFFICE OF WATER RESOURCES

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GUW 360 FIELD 13G,14E, 8H, 8E

UNIVERSITY OF NEVADA, GRADUATE SCHOOL, DESERT RESEARCH INST, NEVADA

COMPUTER LABORATORY PROJECT

P. DOMENICO, P. *. DOMENICO, G. B. MAXEY
J. MERKLE, R. RHODES

INT-WR-B-995-NEV
/66- /

INTERIOR-OFFICE OF WATER RESOURCES

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JAY 1 FIELD 13G,11F,11G,20K

UTAH ST UNIV OF AGRIC, SCHOOL OF ENGINEERING, MECHANICAL ENGINEERING, UTAH

STRUCTURAL PERFORMANCE OF BURIED FLEXIBLE CONDUITS CONSTRUCTED OF STAINLESS STEEL

R. K. WATKINS

4/65-10/65

ALLEGHENY LUDLUM STEEL CORPORATION

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JWM 1 FIELD 13G

COLORADO STATE UNIV, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, COLORADO

HARVARD GULCH FLOOD CONTROL PROJECT - C ITY OF DENVER

J. RUFF, S. KARAKI

8/65- 7/66

WRIGHT-MCLAUGHLIN ENGINEERS

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JXX 1 FIELD 7A, 7D, 9C, 9A

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, ILLINOIS

ELECTROKINETIC PUMPING OF LIQUIDS

C. D. HENDRICKS, J. B. TSUI

/65- /

XEROX CORPORATION

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NIL 179 FIELD 13G

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, ILLINOIS

WATER WAVE - STRUCTURE INTERACTION

J. P. MURTHA, C. C. PETRAUSKAS

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ILLINOIS, UNIVERSITY OF

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WSI 3 FIELD 13B,20L

UNIV OF ROORKEE, INDIA

BEHAVIOUR OF PILE GROUPS SUBJECTED TO DYNAMIC LATERAL LOADS

S. PRAKASH, S. L. AGARWAL

12/65-12/66

COUNCIL OF SCIENTIFIC + INDUSTRIAL RES

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YCA 651 1 FIELD 13B, 7A, 7D, 7B

ENGINEERING SCI INC, OAKLAND, CALIFORNIA

IN-SITU INVESTIGATION OF MOVEMENTS OF GASES PRODUCED FROM DECOMPOSING REFUSE

H. F. LUDWIG, W. BISHOP, F. BOWERMAN
R. CARTER, J. SCHERFIG, T. WU

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STATE-CALIFORNIA

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YIL 289 FIELD 20L,20K

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, ILLINOIS

FLEXURAL FATIGUE STRENGTH OF WELDED BEAMS AND GIRDERS

J. E. STALLMEYER, T. R. BOBLENZ
J. M. FISHER, D. W. GOODPASTURE

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STATE-ILLINOIS

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YIL 299 FIELD 13F,11B,20L,20K

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, THEORETICAL + AP MECH, ILLINOIS

MECHANISM OF FATIGUE FAILURE IN CONCRETE

C. E. KESLER, S. H. KUNG, J. P. LLOYD
J. L. LOTT, J. A. NEAL

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STATE-ILLINOIS

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YIL 300 FIELD 13F,11B,20L,20K

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, THEORETICAL + AP MECH, ILLINOIS

CREEP IN STRUCTURAL CONCRETE

C. E. KESLER, J. L. LOTT, E. M. WALLO
R. L. YUAN

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STATE-ILLINOIS

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ZPE 1003 FIELD 13A,12A, 5A

ATMOSPHERIC DIFFUSION STUDIES

J. E. CARSON, H. MOSES

/66- /

AEC-BIOLOGY + MEDICINE

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ZPE 1226 FIELD 11G,13H,20D

BATTELLE MEMORIAL IN, OHIO

DEVELOPMENT OF A TRACER SYSTEM FOR IN-PLACE FILTER EVALUATION

R. I. MITCHELL

/66- /

AEC-BIOLOGY + MEDICINE

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ZJA 140 FIELD 11F,13H,11G

USA, ORD CORPS, WATERVLIET ARSNL, NEW YORK

ANELASTIC RELAXATION

L. MIESEL

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

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ZQN 530524 4 FIELD 13J,12A

USN, BUR SHIPS, CARDEROCK-D T MOD BAS, MARYLAND

AIRCRAFT CARRIER-DECK MOTION STUDIES

D. LINQUIST

/65- /

DOD-NAVY

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ZQN 530595 FIELD 20L,20K,10B

NAVAL AIR DEVELOPMEN, PENNSYLVANIA

STRUCTURE FABRICATION METHODS FATIGUE STUDIES

A. P. COWLES

/65- /

DOD-NAVY

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ZQN 544075 FIELD 13G,13B

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

DISTRIBUTION OF LIQUIDS IN POLAR CAMPS

C. R. HOFFMAN, E. H. MOSER

/65- /

DOD-NAVY

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ZQN 544077 FIELD 15G

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

SNOW TUNNEL WALL MAINTENANCE EQUIPMENT

S. E. GIFFORD

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DOD-NAVY

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ZQN 544078 FIELD 13J,13F,10B,15G

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

FLOODING EQUIPMENT

C. R. HUFFMAN, E. H. MOSER

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DOD-NAVY

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ZQN 544085

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

TECHNICAL PROGRESS SURVEY OF POLAR ENGINEERING AND CONSTRUCTION

R. C. COFFIN, E. H. MOSER

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DOD-NAVY

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ZQN 544098 FIELD 13J,13G

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

LIGHT DUTY GROUND ANCHORS

P. A. DANTZ

/65- /

DOD-NAVY

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ZQN 544099 FIELD 13B,20K

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

ANCHORAGES IN VARIOUS SOIL MEDIUMS

R. J. SMITH

/65- /

DOD-NAVY

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ZQN 544... FIELD 13B

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

LATERAL PLATE TESTS

H. L. GILL

/65- /

DOD-NAVY

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ZQN 544101 FIELD 13F

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

ANTARCTIC SURFACE TRANSPORTATION ANALYSIS

S. E. GIFFORD, E. H. MOSER

/65- /

DOD-NAVY

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ZQN 544103 FIELD 13B

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

MINIMUM WATER SANITARY SYSTEM

W. R. NEHLSEN

/65- /

DOD-NAVY

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ZQN 544117 FIELD 15+, 9+,15G

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

FIXED AND REEL TYPE CO2 SYSTEMS

C. W. TERRY

/65- /

DOD-NAVY

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ZQN 544122 FIELD 8H,15G

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

STUDY OF POTABLE WATER IN PROBLEM AREAS

W. R. NEHLSEN

/65- /

DOD-NAVY

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ZQN 544129 FIELD 13G,11L

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

WATERFRONT STRUCTURES - WRAPPING OF PILES

F. ROE, W. S. HAYNES

/65- /

DOD-NAVY

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ZQN 544136 3 FIELD 13J,20K

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

STRUCTURES IN DEEP OCEAN - MECHANICS OF PLACING AND RECOVERING HEAVY LOADS IN DEEP OCEAN WATER

B. J. NUGA, J. J. HROMADIK

/65- /

DOD-NAVY

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ZQN 544174 4 FIELD 13J, 8H

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

DEEP OCEAN ANCHORAGES

S. E. SMITH, P. A. DANTZ

/65- /

DOD-NAVY

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ZQN 544176 FIELD 13J

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

STRUCTURES IN DEEP OCEAN - DEEP OCEAN MANUAL FOR THE COMPLETION OF CHAPTER 7

J. E. SMITH, J. J. HROMADIK

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DOD-NAVY

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ZQN 544196 FIELD 13J,10B

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

SHIFTING BALLAST IN A ROLLING UNIT AS A MEANS OF LOCOMOTION FOR A DEEP OCEAN VEHICLE

C. HERNDON, R. E. JOCHUMS

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DOD-NAVY

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ZUG 846 FIELD 8D, 5A

MATERIALS HANDLING - PHYSICAL PROPERTIES AND FLOW MECHANISMS

C. J. STEHLIK, R. S. FOWKES
G. A. WANCHECK

INT-BM-6111541-1
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INTERIOR-BUREAU OF MINES

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ZUG 848 FIELD 8D, 8G

PRELIMINARY STUDIES OF FUNDAMENTALS OF ABRASION

J. TERICHOW, T. E. FINCH

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INTERIOR-BUREAU OF MINES

14 METHODS AND EQUIPMENT

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GSC 905 FIELD 20D,20K

VARIABLE PRESSURE, TWO-PHASE WATER TUNNEL

E. SILBERMAN

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GSP 2012 1 FIELD 7D,20J,20F

UNIV OF MINNESOTA, GRADUATE SCHOOL, CHEMISTRY, MINNESOTA

CONSTRUCTION OF AN INFRARED GRATING SPECTROMETER

R. L. CRAWFORD, J. OVEREND

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3/66- 3/67

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ZQF 260010 FIELD 7D,20J,18A,20D

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

ANALYSIS OF ELECTROMAGNETIC MATERIALS

J. P. CALI

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DOD-AIR FORCE

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ZQF 260043 FIELD 9C, 8+, 9+

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

REMOTE DETECTION TECHNIQUES

W. H. PAULSEN

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DOD-AIR FORCE

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ZQF 260060 FIELD 22B,22A,22D,17G

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

SYSTEMS INTEGRATION

C. W. CHAGNON

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ZQF 420550 FIELD 6B,13+, 9+, 9A

USAF, ARNOLD AFS, TENNESSEE

DEVELOPMENT OF HYPERVELOCITY FORCE MEASURING SYSTEM

R. L. LEDFORD

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ZQF 420568 2 FIELD 22C,20D,10B

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THREE AXIS THRUST MEASUREMENT

F. H. FERGUSON

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ZJG 805 FIELD 3A, 5A

MULTIDISCIPLINARY RESEARCH LEADING TO UTILIZATION OF EXTRATERRESTRIAL RESOURCES

T. C. ATCHISON, O. E. FOGELSON
C. W. SCHULTZ, O. TERICHOW

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INTERIOR-BUREAU OF MINES

15 MILITARY SCIENCES

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ZQN 543005 FIELD 15G

APPLICATION OF READINESS CRITERIA TO ALLOWANCE LISTS - VALIDATION

K. W. RANDOLPH

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DOD-NAVY

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ZQN 544086 FIELD 15C,15G

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

ADVANCED PLANNING POLAR

E. H. MOSER, R. C. CUFFIN

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16 MISSILE TECHNOLOGY

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ZQN 530571 FIELD 20D,10B

USN, BUR SHIPS, CARDEROCK-D T MOD BAS, MARYLAND

MISSILE ROLL RATE CHARACTERISTICS WIND TUNNEL INVESTIGATION

R. BROBERG

/65- /

DOD-NAVY

18 NUCLEAR SCIENCE AND TECHNOLOGY

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7SX 2196 4 FIELD 5A,18A

FRANKLIN + MARSHALL, UNDERGRADUATE SCHOOL, PHYSICS, PENNSYLVANIA

ENVIRONMENTAL RADIOACTIVITY

R. I. WELLER

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PHS-BSS

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7ZX 455 3 FIELD 7D,20H, 5A,18A

USDHEW BSS ENGIN CTR, SANI ENG CTR,CINCINNAT, OHIO

DEVELOPMENT OF METHODS FOR THE IDENTIFICATION AND CALIBRATION OF RADIONUCLIDES IN ENVIRONMENTAL AND BIOLOGICAL MEDIA

H. E. KOLDE, G. J. KARCHES, R. J. VELTEN T. B. YEAGER

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GSE 846 FIELD 13+, 9+,10B,18A

UNIVERSITY OF MICHIGAN, SCHOOL OF ENGINEERING, NUCLEAR ENGINEERING, MICHIGAN

SOLID-STATE ELECTRONICS IN NUCLEAR ENGINEERING

C. KIKUCHI, G. F. KNOLL

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ZPE 960 FIELD 7D,19D,12A,18A

US, AEC, BERKELEY, CALIFORNIA

PREDICTION OF RADIONUCLIDE PRODUCTION BY NUCLEAR EXPLOSIVE DEVICES

M. D. PRATT, Y. C. NG

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AEC-BIOLOGY + MEDICINE

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ZPE 1453 FIELD 7D,20D, 7B

CHARACTERISTICS, TRANSPORT, AND RETENTION OF RADIOACTIVE PARTICLES

L. C. SCHWENDIMAN, A. K. POSTMA
G. A. SEHMEL

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AEC-BIOLOGY + MEDICINE

19 ORDNANCE

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ZQA 157 2 FIELD 15G

USA, ORD CORPS, WATERTOWN ARSNL, MASSACHUSETTS

HYPER VELOCITY IMPACT

C. RIDDLE

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ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

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ZQA 158 FIELD 19+

USA, ORD CORPS, SPRINGFIELD ARM, MASSACHUSETTS

SILENCER STUDIES AND FLASH SUPPRESSION FOR SMALL ARMS

J. KNOLEK, J. ONEIL, W. WATLING

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ZQA 195 FIELD 15C,15G

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

CONCEPT + FEASIBILITY STUDIES OF HYPERMOBILE ARTILLERY

W. E. HEIDEL, R. SPROTT

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ZQA 196 FIELD 15G

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

CONCEPT + FEASIBILITY STUDIES ON AUTOMATION OF ARTILLERY WEAPONS

S. C. THODOS

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ZQA 212 1 FIELD 15G

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

ENGINEER + DEVELOPMENT OF RESERVOIR + MULTI-BAFFLE TYPE MUZZLE BRAKE

M. J. SALSBURY

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USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

CONCEPT STUDIES FOR NEW COMPONENTS + SYSTEMS FOR ARTILLERY WEAPONS

W. W. WELLS, H. A. WIESE

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ZQA 214 FIELD 12A,15G

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

DESIGN + ANALYSIS OF A FUNCTION CONTROL R3D

R. H. COBERLY

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ZQA 215 FIELD 12A, 5C,15C,15G

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

ANALYSIS + SIMULATION OF CARRIAGE DYNAMICS

R. H. COBERLY

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ARTILLERY CONSULTING

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ZQA 217 FIELD 15G

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

FEASIBILITY AND DESIGN STUDIES ON 105MM RAPID FIRE WEAPON SYSTEM

C. R. SHAFFER, J. COPPERSMITH

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ZQA 229 FIELD 11G,19+,15C

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

RESEARCH RELATED TO IMPROVED SILHOUETTE TARGET MATERIAL

A. C. SAUNDERS

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ZQN 530570 FIELD 20L,20D,20K,15G

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ROCKEYE II DISPENSER SEPARATION INVESTIGATION

R. BROBERG

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20 PHYSICS

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GQQ 595249 FIELD 5A,20L

UNIVERSITY OF MARYLAND, GRADUATE SCHOOL, PHYSICS + ASTRONOMY, MARYLAND

MAGNETOACOUSTIC INVESTIGATIONS IN METALS

A. C. SINCLAIR, J. M. LEIBOWITZ

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DEFENSE-ADVANCED RES PROJECTS AGENCY

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PHONON-ELECTRON INTERACTIONS IN SUPERCONDUCTORS

J. R. LEIBOWITZ, J. G. STCLAIR

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GQQ 595258 3 FIELD 5A,18A,20D,20L

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DIFFUSION AT HIGH PRESSURE

H. W. SCHAMP, I. W. JONES

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THERMAL CONDUCTIVITY OF SUPERCONDUCTORS

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MAGENTORESISTANCE IN RARE EARTHS

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GSE 311 2 FIELD 7D,11G,12A

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PROBLEMS IN THE THEORY OF FINITE ELASTIC DEFORMATIONS

R. T. SHIELD

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GSE 654 FIELD 11B,11F,11G,20L

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RESPONSE OF CONCRETE STRUCTURES TO CYCLIC LOADING

K. H. GERSTLE, L. G. TULIN

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GSE 679 FIELD 11F,11G

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STRUCTURES OF DEFORMED INTERMEDIATE PHASES

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GSE 682 FIELD 11G,20F,20L

ILLINOIS INST OF TECH, SCHOOL OF ENGINEERING, MECHANICS, ILLINOIS

DYNAMIC PHOTOELASFICITY

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GSE 706 FIELD 11G,11D,20L,20K

UNIVERSITY OF FLORIDA, SCHOOL OF ENGINEERING, ENGIN SCIENCE + MECH, FLORIDA

PLASTIC ANALYSIS OF SANDWICH STRUCTURES

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GSE 719 FIELD 8K,11G,20L,20K

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DYNAMIC RESPONSE OF ELATO-INELASTIC STRUCTURES

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GSE 727 FIELD 3A,11B,11G,20L

UNIV OF ROCHESTER, SCHOOL OF ENGINEERING, AEROSPACE + MECH SCI, NEW YORK

RESPONSE OF SOLIDS TO LASER PULSE IRRADIATION

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GSE 767 FIELD 11F,13H,11G, 9A

PENNSYLVANIA ST UNIV, GRADUATE SCHOOL, PHYSICS, PENNSYLVANIA

ATOMIC STRUCTURE OF MECHANICAL AND ELECTRICAL CONTACT POINTS

E. W. MUELLER

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GSE 761 FIELD 11B,20K

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ANALYSIS OF STRUCTURES INVOLVING PYROLYTIC GRAPHITE

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PLASTIC FLOW THROUGH CONVERGING SURFACES

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VIBRATIONS OF SHELLS

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THEORETICAL AND EXPERIMENTAL STUDIES ON NONLINEAR RHEOLOGY

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PLASTIC AND VISCOUS DEFORMATION

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GSE 777 FIELD 11G

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COMMINUTION OF BRITTLE MATERIALS

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GSE 782 FIELD 11F,11G

STANFORD UNIVERSITY, SCHOOL OF ENGINEERING, MATERIALS SCIENCE, CALIFORNIA

DISLOCATION VELOCITIES IN METALS AT HIGH TEMPERATURES

W. D. NIX, J. C. SHYNE

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GSE 785 FIELD 20D

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THEORETICAL AND EXPERIMENTAL STUDIES IN FLUID MECHANICS

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GSE 787 FIELD 20M, 5A

AMER. SOC. OF MECH., NEW YORK

THIRD SYMPOSIUM ON THERMOPHYSICAL PROPERTIES

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GSE 789 1 FIELD 20K

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YIELD CRITERION FOR REINFORCED CONCRETE SLABS

M. A. SOZEN, W. L. GAMBLE

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GSE 818 FIELD 20D

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FLOW IN POROUS MEDIA

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GSE 820 FIELD 20L

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INVESTIGATION OF ENGINEERING ELASTOMECHANICS

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GSE 821 FIELD 11G

OHIO STATE UNIVERSITY, SCHOOL OF ENGINEERING, METALLURGICAL ENGIN, OHIO

DEFECT INTERACTION IN THE DIFFUSION ZONE OF BINARY DIFFUSION COUPLES

G. W. POWELL, J. P. HIRTH

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GSE 823 FIELD 20D

TIME DEPENDENT FLOW AND BOUNDARY LAYER PHENOMENA

S. C. ROBERTS

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GSE 825 FIELD 20L,20D,20K

NORTHWESTERN UNIV, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, ILLINOIS

FORCES ON A SPHERE ACCELERATING IN A VISCOUS FLUID

A. S. HAMILTON, L. F. MOCKROS

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GSE 827 FIELD 20D,20K

PURDUE UNIVERSITY, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, INDIANA

FLUIDELASTIC OPERATORS FOR UNDER-STREAMLINED STRUCTURES

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GSE 834 FIELD 11G,20D

COUPLING OF FLOWS THROUGH POROUS MATERIALS

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GSE 838 FIELD 9+,20F

WORCESTER POLY INST, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, MASSACHUSETTS
WAVE PROPAGATION

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GSE 840 FIELD 20D

UNIVERSITY OF MICHIGAN, SCHOOL OF ENGINEERING, MECHANICAL ENGINEERING, MICHIGAN

STABILITY OF THE OSCILLATING FREE-CONVECTIVE BOUNDARY LAYER

J. A. CLARK, V. S. ARPACI

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BOUNDARY LAYER FLOW OF A RADIATING GAS

R. D. CESS

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MASS INST OF TECHNOL, SCHOOL OF ENGINEERING, MECHANICAL ENGINEERING, MASSACHUSETTS

INFLUENCE OF CORIOLIS FORCES ON TURBULENT FLOW IN DUCTS

P. G. HILL, H. L. MOSES

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GSE 860 FIELD 20L

CAL INST OF TECHNOLOGY, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, CALIFORNIA

INJECTION AND RECOMBINATION MECHANISMS IN SEMICONDUCTORS

A. YARIV

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ELECTAON ENERGY BANDS IN METALS

C. T. WEI

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GSE 862 FIELD 7D,20J,20D

CRYSTAL NUCLEATION USING ULTRA HIGH VACUUM MOLECULAR BEAM TECHNIQUES

J. B. HUDSON

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GSE 863 FIELD 20L

UNIV OF CAL-BERKELEY, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, CALIFORNIA

PROPAGATION OF ELASTIC WAVES IN SEMICONDUCTORS

R. M. WHITE

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GSE 864 FIELD 11G,20L

CARNEGIE INST TECHNOL, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, PENNSYLVANIA

NEW STRUCTURES IN ALLOYS AND SEMICONDUCTOR MATERIALS

R. L. LONGINI, G. M. POUND

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GSE 866 FIELD 20L

RICE UNIVERSITY, SCHOOL OF ENGINEERING, MECHANICAL ENGINEERING, TEXAS

RADIATION DAMAGE IN SEMICONDUCTORS

M. L. RUDEE

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GSE 867 FIELD 20L, 7B

STEVENS INST OF TECH, SCHOOL OF ENGINEERING, METALLURGY, NEW JERSEY

ELECTROMECHANICAL EFFECTS IN ALKALI HALIDE SINGLE CRYSTALS

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GSE 870 FIELD 20I

CASE INST OF TECHNOL, SCHOOL OF ENGINEERING, MECHANICAL ENGINEERING, OHIO

SHOCK TUBE INVESTIGATIONS OF HIGH TEMPERATURE GAS

E. J. MORGAN, W. B. JOHNSON, S. OSTRACH

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GSE 874 FIELD 20J,20L

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SPECTROSCOPIC STUDIES OF MAGNETIC MATERIALS

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GSE 880 FIELD 20I

THERMAL RADIATION ON ONE-DIMENSIONAL SHOCK WAVE PROPAGATION

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GSE 881

CITY UNIV N Y NEW YORK, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, NEW YORK

CENTRIFUGAL ELECTROSTATICALLY FOCUSED ELECTRON BEAMS

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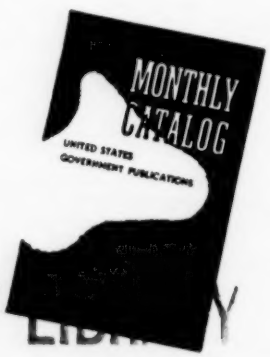

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